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Se agradecen canjes

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EDITORIAL

El Ciudadano Ministro de Sanidad y Asistencia Social, Dr. Félix Lairet, hijo, ha tenido la bondad de conceder al Boletín de Entomología Venezolana, una asignación anual que le permitirá cubrir parte de los gastos de imprenta. Damos al señor Ministro y a los doctores Rafael Angel Camejo, Director de Gabinete y Armando Castillo Plaza, Director de Salubridad Pública, nuestras más expresivas gracias por tan señalado favor.

El Ciudadano Ministro de Educación Nacional, también ha expresado su intención de ayudarnos a cubrir los gastos de imprenta en un futuro próximo.

Estas asignaciones nos permitirán más adelante ampliar nuestras ediciones que ya están siendo reclamadas en todos los institutos científicos, publicarlo en fechas fijas y mejorar el tipo de los separados que corresponden a los autores.

Queremos hacer de este Boletín un exponente digno de las investigaciones entomológicas en Venezuela como nuestro aporte al mejor conocimiento de las Ciencias Naturales de nuestra patria, cosa que no hubiese sido posible sin el apoyo de algunos Ministerios y de nuestras instituciones culturales.

R44

NEUROPTERA OF NORTHERN SOUTH AMERICA

Nathan Banks

Museum of Comparative Zoology. Cambridge, Mass.

—

Under the above title I hope from time to time to publish lists and synoptic tables together with descriptions of new species that I have seen from Venezuela and its neighboring countries, Colombia and the Guianas.

The material from Venezuela is largely that sent by P. J. Anduze, but there are several lesser lots. About 1908 A. H. Fassl collected many specimens from the Andean regions of Colombia; more recently Doctors G. Salt and P. J. Darlington collected in the Magdalena region of northeastern Colombia. From British Guiana some material came from the late Dr. W. M. Wheeler, also from Dr. William Beebe, Dr. N. A. Weber and others. From Surinam Dr. D. C. Geijskes has sent a considerable amount, and from Cayenne some specimens were secured years ago from E. Le Moult.

The Museum of Comparative Zoology had some old material, mostly from the Hagen collection; other specimens have been studied from the Cornell University collection, the American Museum of Natural History, from the Academy of Natural Sciences of Philadelphia, and from the Field Museum.

Part I

MEGALOPTERA

Family Sialidae

The three genera may be distinguished as follows:

1 — No ocelli; head without tooth or projection behind eyes; mandibles small, not noticeable; pronotum broader than long, but few coastal cross-veins..... *Protosialis.*

Three distinct ocelli; a more or less distinct tooth or process each side behind eyes; mandibles large and prominent; pronotum longer than broad; numerous costal cross-veins 2

2 — Clypeal margin not toothed; male mandibles not elongate; wings without large dark patches or clouds; the veins pale yellowish and cross-veins black... *Chloronia.*

Clypeal margin with processes or teeth, usually roughened; mandibles of male more or less elongate; wings with large dark spots and patches or clouds; usually some hyaline white dots; very large insects.... ..... *Corydalus.*

Protosialis flavicollis Enderl.

Described from Colombia.

CORYDALUS

Females:

1 — Antennae black from the third or fourth joint out..... 2

Antennae pale over most of basal half, black toward tip. 5

2 — Clypeal margin without either median or lateral projections; head, pronotum and legs pale yellow, tibiae without dark mark at base; first radial cross-vein hardly oblique; fore wings only lightly marked with dark.. ..... *nubilus.*

Clypeal margin with three or four projections, and the margin more or less dark; often whole head dark.. 3

3 — Clypeal margin with four projections, two in middle near each other; wings with a uniformly dark area at the stigmal area (the cross-veins not showing darker) before this mark a clear costal area with the cross-veins pale, basal half of costal area also dark..... *bolivari.*

Clypeal margin with three teeth, the median may be low and broad, and sometimes it is emarginate, but not forming two separate teeth..... 4

4 — Head and pronotum gray to yellowish, sides of pronotum narrowly black; costals many and close together, sometimes fifty, some cells on basal part over four times as long as broad; tibae at base above black..... ..... *nevermanni.*

Head and pronotum yellowish brown to brown; rarely fifty cross-veins, and on basal part farther from each other; wings rather evenly gray, with many white dots..... *peruvianus.*

5 — Fore wings not over fifty millimeters long; fore wings gray with many rounded white dots; middle lobe of clypeus not divided..... *similis.*

Fore wings fully fifty millimeters long, sometimes as much as eigthty..... 6

6 — Middle lobe of clypeal margin almost divided into two; fore wing dark, almost black, broken up by many irregular white spots, basal part pale with some dark spots in the cells..... *tesselatus.*

Middle lobe of clypeal margin not divided; fore wing mostly gray, with many small rounded white dots..... ..... *armatus.*

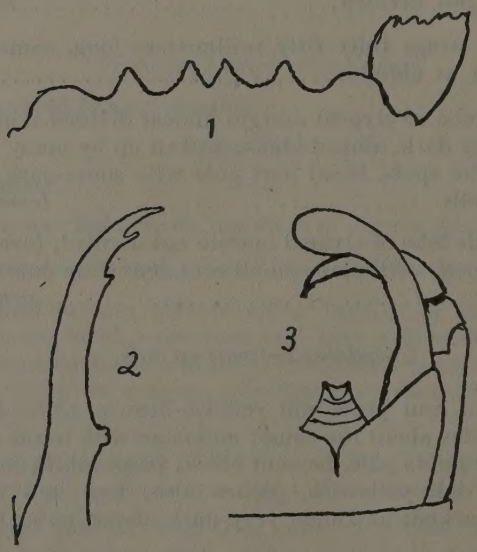
Corydalus bolivari sp. nov.

♀ : Head and pronotum reddish-brown, without markings, mandibles about the same; antennae with basal and one or two other joints pale, beyond black; palpi black; meso and metanotum dull yellowish, pleura also; legs dull reddish-yellow, unmarked; abdomen very dark above, paler beneath.

Fore wings with the costal area a uniform brown for two-thirds way out, the cross-veins black, then a pale, faintly yellowish spot covering four or five cross-veins which are also pale, beyond is an evenly dark brown stretch covering seven or eight cross-veins which are no darker than the membrane, and then another shorter pale spot covering about three cross-veins which are also pale, then a short strip of

brown to the tip of costal area; the largest of the above pale areas reaches back into the radial area, otherwise radial area brown, except for a few round white dots.

Behind the radial area the apical half of wing is largely brown, with black cross-veins, but an area between the last two series of gradates is paler. Basal half of wing largely hyaline, but the dark cross-veins are mostly bordered, the one from the lower branch of medius to the cubitus especially prominent; there are scattered pale spots in both apical and basal parts.



CORYDALUS BOLIVARI

1 — Clypeal margin.

2 — Mandible.

3 — Genitalia from above.

Hind wings largely gray, paler on basal part, at base of apical third of costal area is a small pale strecht, and beyond brown; cross-veins nearly black; no pale rounded dots.

The clypeal margin has practically four nearly equal teeth, the usual median one being divided into two teeth close together; each side behind eyes the lateral carina is especially distinct; the marginal tooth behind is short and blunt; the mandibles have the three teeth rather short, the last fairly acute. The pronotum is about as usual, but behind it is broadened rather more than usual.

The fore wings are about as in *C. batesi*, with thirty-five to forty costals, those on basal part fairly well separated; the first radial cross-vein is very oblique.

The male is similar, but the wings are paler on the basal half; the pale and brown costal spots are as in the female; beyond the apical part is pale brown, with dark cross-veins, few pale spots; before and just beyond the first radial cross-vein the membrane is hyaline; the basal half of costal area mostly pale, and the black cross-veins very distinct, behind the costal area the basal part is largely clear, and the cross-veins are less broadly bordered than in the female.

Hind wings mostly pale gray in basal half, and more or less plainly brown in apical half; the male genital parts are pale, the eleventh dorsal plate broad, the superior appendages rather short, a little widened near base, and the tip clavate; the inferior appendages also rather short, the apical part curving in, tapering toward tip which has a short black spine, each process clothed with yellowish hair.

Mandibles of male hardly equal head plus pronotum, only slightly curved near tip, and two small teeth before it, a bifid

tooth or swelling on inner edge at about end of first third; antennae from middle out have the joints swollen at tip below, but not strongly roughened.

Length of fore wing ♀ 48 to 58 mm., width 14 to 17 mm.
Length of fore wing ♂ 56 mm., width 16 mm.
Mandibles of ♂ 11 to 12 mm.

Type from "Venezuela, Appun", (Hagen coll.) MCZ Nº 26.019 paratypes from there, and Los Canales, Naiguata, Venezuela, 24 September (G. Vivas Berthier); Páramo La Negra, 14 August (P. J. Anduze).

The wings in appearance are very similar to those of *C. batesi,* but in the latter the costal cross-veins are all dark and show plainly in both brown and pale areas; *batesi* has the antennae pale yellowish, except the black tip, and the clypeal margin has not such large teeth.

The type specimen is the one used by Davis (1903) for his description of *C. nubilus, but* the latter is a very different species, figured by Van der Weele.

Corydalus armatus Hagen.

Type from Venezuela; also Maracay, Choroní, 11 Aug. (Lichy); La Mucuy, 2.500 m., Merida, 17 June (Anduze).

Colombia - Pacho, East Colombia, 2.500 m. (Fassl); and San Vincente (Bequaert).

Corydalus peruvianus Davis.

Colombia; Praetera, 1.200 m. Jan. (Fassl); Cali, 1.000 m. Nov. (Fassl); Rio Cantino, Muzo, 500 m. Dec. (Fassl). Venezuela, Caracas, 19 April (Anduze).

The flavescent form from Colombia: San Antonio, 1.800 m. Dec.; San José, Rio Dagna, 150 m. May; Villavicencio 450 m. 11 Feb. all taken by Fassl.

Type from Peru.

Corydalus nubilus Erichs.

Colombia; Baraio, 31 Jan., 12 Febr. (Williamson).

Venezuela: Akuriman, Oct. (Anduze).
Described from British Guiana.

Corydalus nevermanni Navas.

Venezuela: Caracas, 11 Febr. (Serres); San Esteban, 18, 21 Nov. (Anduze).

Described from Costa Rica.

Corydalus similis Stitz.

One male from Huasco, E. Cordillera, 500 m. Nov. Colombia (Fassl).

Described from Mexico, and I have seen specimens from Guatemala, Costa Rica, and Panama.

Corydalus titschacki Navas.

Described from British Guiana, but I have not seen it unless it is *C. similis.*

Corydalus tesselatus Stitz.

Colombia, Sn. Antonio, 2.000 m. Febr. (Fassl.) Described as a variety of *C. batesi*, but it is a distint species.

Chloronia bogotana Weele.

Several specimens of this striking little species: Venezuela, Borburata, Carabobo, 23 April (R. Lichy); San Esteban, Oct. (Anduze); Agua Negra, 4 May.

Types came from Bogota, Colombia.

RESUMEN

Bajo el título que antecede se propone el autor publicar sobre la fauna de Venezuela y los países que le son limítrofes. En este trabajo se trata de los MEGALOPTERA, Familia *Sialidae,* describiéndose al *Corydalus bolivari* sp. nov. El tipo fué coleccionado por Appun en Venezuela (no se conoce la localidad exacta de su colección). Los paratipos provienen de los Canales de Naiguatá (Vivas Berthier) y el Páramo La Negra (Anduze).

El material venezolano, en su mayor parte ha sido coleccionado por Anduze pero hay varios lotes más. En 1908 A. H. Fassl coleccionó muchos ejemplares en las regiones andinas de Colombia; recientemente los doctores G. Salt y P. J. Darlington coleccionaron en la región del Magdalena en el Noreste de Colombia. El material de la Guayana Británica proviene de colecciones hechas por el finado Dr. W. M. Wheeler y de las colecciones de los doctores William Beebe, N. A. Weber y otros. El material de Surinam fué enviado casi todo por el Dr. D. C. Geijskes y algunos ejemplares de Cayena fueron obtenidos por E. Le Moult.

El Museum of Comparatvie Zoology tenía algún material viejo casi todo de la colección Hagen; también se han estudiado los ejemplares de la colección de Cornell University, los del American Museum of Natural History, los de la Academy of Natural Sciences de Philadelphia y los del Field Museum de Chicago.

R47

NEW ANTS FROM VENEZUELA AND NEIGHBORING COUNTRIES

By Neal A. Weber.

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The following ants were taken in Venezuela, Trinidad, B. W. I., British Guiana, Surinam and the Panama Canal Zone. They are mostly described at this time in order to use their names in non-taxonomic biological studies.

The new *Pogonomyrmex (Ephebomyrmex)* from Venezuela is of particular interest in that it bridges the considerable gap in the distribution of these harvesting ants between Guatemala and southern Brazil, Bolivia and Chile. British Guiana is also added to the range through the ocurrence of a form, closely related to the Venezuelan species, on the Rupununi Savannahs. The members of this genus and subgenus occur from Texas to Uruguay and Argentina but intermediate records are rare. They are animals of the desert or dry plains and are represented in the Old World by the Biblical harvester, *Messor,* very common in Africa, Southwestern Asia and neighboring regions.

The distinctness of the Venezuelan and British Guiana *Ephebomyrmex,* like the distinctness of two fungus-growing ants from the same two localities *(Acromyrmex (Moellerius) balzani,* susbpecies *planorum* and *myersi* Weber), presents a problem. It would seem that the Venezuelan llanos immediately north of Ciudad Bolívar and the Rupununi Savannahs in British Guiana, although not separated greatly in space, must either afford different ecological niches or have been long separated by other barriers. The Sierra Pacaraima may well be a more important barrier than the rivers between the localities.

The new *Leptothorax*, from a bat cave in Venezuela and sent by Mr. Pablo J. Anduze, is particularly striking in coloration, sculpturing and large size. It does not appear to have especial morphological adaptations to life in a cave.

The tree ants, *Dendromyrmex*, are rarely seen nocturnal ants living in arboreal carton nests and will undoubtedly be found in Venezuelan Guiana although those here described are from Panama, British Guiana and its boundary with Surinam.

Eciton

Eciton (Neivamyrmex) angustinode Emery, *haskinsi* ssp. nov.

Worker. ·Extended length 2.9-3.5 mm. (thorax, excluding "neck", 0.9-1.1 mm.) Meso-epinotal suture in side view indicated feebly by the change in the slight convexity of the promesonotum passing into the almost plane epinotum. Eyes faintly indicated by a pale spot 0.029 mm. in diameter in the maxima worker. Smooth and shining except for coarse piligerous punctations and an epinotum which is striate-punctate, the striae extending anteriorly on the thoracic sides above all coxae and on the petiole. Pilosity of scattered, long, fine, yellowish hairs. Rich brown, gaster distinctly, and pedicel less distinctly, paler.

Described from workers found in high rain forest on the slopes of Morne Bleu in the Northern Range of Trinidad, B. W. I. June 23, 1935 (Nº 209.2) by my companion, Dr. C. P. Haskins. The ants were exploring tunnels in rotted wood of old stumps.

Fig. 1.—Worker of *Eciton (Neivamyrmex) angustinode ssp. haskinsi*, ssp. nov.

Differing from the typical *angustinode* in possessing a postpetiole which is broader, when viewed from above, a head much longer with distinctly longer antennal scapes, the meso-epinotal suture much less marked and the body more shining, having a less coarse sculpturing. Differing from cotypes of the subspecies *emersoni* Wheeler in possessing a less marked meso-epinotal suture and a less trapezoidal postpetiole when viewed from above. In general habitus resembling cotypes of *N. adnepos* Wheeler but much larger and darker with a meso-epinotal suture less distinct.

Pogonomyrmex

Pogonomyrmex (Ephebomyrmex) venezuelensis, sp. nov.

Worker. Extended length 4.9-5 mm. (thorax 1.4 mm.) Head in front view excluding mandibles, quadrate, slightly longer than broad back of eyes, occipital margin transverse, anterior clypeal margin feebly emarginate; eyes situated approximately in the middle of the head and moderately convex; mandibles strongly convex, with blunt teeth; antennal scapes failing to attain the occipital corners by less than twice their distal diameter, funicular joints 3-7 about as broad as long. Thorax in side view irregularly convex and with triangular, acute epinotal and similar episternal spines, the latter slightly lower, from above triangular with rounded anterior margin and shoulders. Petiole in side view with long peduncle which bears mid-ventrally an obtuse projection, and an acute, forwardly directed node; from above the peduncle appears laterally compressed and the node rectangular with rounded anterior margin and feebly converging sides. Postpetiole in side view with vertical anterior face, convex dorsum and lobate ventral margin; from above as long as broad, sides converging anteriorly and convex. Gaster ovoid with a large sting variably exserted.

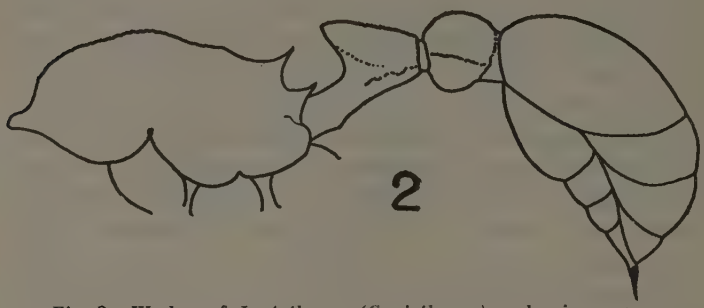

Fig. 2.—Worker of *Leptothorax (Goniothorax) anduzei*, sp. nov.

Coarsely sculptured, finely punctate basally; head striate, becoming reticulate-striate at the occiput and sides; mandibles rugose; scapes striate-punctate; thorax coarsely reticulate, becoming vermiculate posteriorly; nodes of pedicel coarsely reticulate; gaster finely striate-punctate anteriorly, smooth and shining except for piligerous punctations.

Pilosity of scattered, short, coarse, vertical hairs which are for the most part obtusely pointed.

Dark ferruginous except gaster which is blackish brown; hairs basally dark brown, apically paler.

Cotypes: workers of a colony (Nº V9b) from the llanos north of Soledad about 15 km., across from Ciudad Bolivar, Venezuela, which I collected January 27, 1935. The ants had crater nests in the sand near the nests of *Acromyrmex (Moellerius) balzani* sp. *planorum* Weber previously described and figured (Wheeler, W. M. 1937. Mosaics and other anomalies among ants. Harvard Univ. Press, Plate II, left photograph; Weber, N. A. 1937. Rev. de Ent. 7:408-409). The llanos here consisted of a type referred to by Dr. J. G. Myers as *Trachypogon-Curatella* savannah, *Trachypogon plumosus* and *Curatella Americana* being the dominants. Other characteristic plants were, according to Myers, *Andropogon condensatus, Axonopus aureus, Aristida* sp. and *Paspalum anceps* among the grasses; *Polygala* sp. and *Paepalanthus capillaceus* among

the herbs; *Bowdichia virgilioides, Byrsonima crassifolia, B. coccolobaefolia* and *Casearia carpinifolia* among the woody plants. It is possible that seeds of some of these afforded food for the *Pogonomyrmex,* a genus characteristically vegetarian and especially seed-eating.

A worker taken by Dr. J. G. Myers (Nº 5606) in British Guiana represents a closely related form which may be called *rupununi,* ssp. nov. It is larger, 5.2 mm. (thorax 1.6 mm.), and darker. The gaster is distinctly more heavily sculptured, being at the base shallowly reticulate-punctate. The ant was taken on the southern Rupununi Savannah November 11, 1935 and it is interesting that a fungus-growing ant, *Acromyrmex (Moellerius) balzani myersi* Weber, which he took here differed also subspecifically from those referred to above in Venezuela.

Pheidole

Pheidole opaca Mayr, *apterostigmoides,* ssp. nov.

Soldier. Extended length 8.3-8.5 mm. (thorax 2.1 mm.) Pronotal gibbosities large and blunt, mesonotum with a transverse bidentate carina. Petiole bituberculate above. Postpetiole about one and one ninth broader than long. Dull, densely punctate with longitudinal striae on the head becoming vermiculate to reticulate posteriorly and at the sides and more coarsely so on the thorax and petiole. Pilosity of moderately abundant long, fine, upright hairs which are shortest on the head. Head dark brown with almost black mandibles and adjacent head. Remainder of body paler brown.

Differing from the typical *opaca* soldier in having a longer postpetiole when viewed from above, more coarsely reticulate pro-mesonotum and darker mandibles and adjacent region of the head.

Worker. Extended length 4.7-5 mm. (thorax, excluding "neck", 1.5-1.6 mm.) Occiput of head prolonged slightly as a "neck", antennae long and slender, general habitus as in *Apterostigma urichi* Forel except for long, acute epinotal spines. Dull and densely punctate basally, with scattered vermiculate-reticulate striae on head, thorax and, feebly, on the pedicel. Pilosity of moderately abundant long, fine upright hairs. Brown, head darker than rest of body.

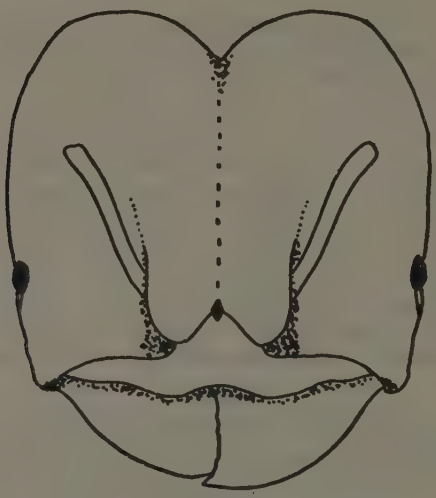

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Fig. 3.—Soldier of *Pheidole opaca ssp. apterostigmoides*, ssp. nov.

Described from a colony (Nº 92) taken in the Basin Hill Forest Reserve, Trinidad, April 1, 1935 by myself. The ants nested close to a colony of *Apterostigma urichi* Forel, moved slowly like the latter and the workers of the two species were remarkably similar.

LEPTOTHORAX

Leptothorax (Goniothorax) anduzei, sp. nov.

Worker. Length 5.-5.5 mm. (of thorax, excluding neck, 1.6-1.7 mm.) Head in front view, excluding mandibles, longer than broad back of eyes; occipital margin transverse, the corners rounded right angles; sides sub-parallel, feebly converging anteriorly and convex; eyes moderately large and convex, situated approximately in the middle of the head; anterior clypeal margin feebly emarginate medially; man-

dibles stout, convex, with a long, acute apical tooth and three progressively smaller teeth with possibly a fourth occasionally formed from the proximal cutting surface; antennae 12-jointed, the scapes slender and exceeding the occipital angles by fully their distal diameters, club indistinctly 3-4 jointed, the terminal 4 joints distinctly longer, when taken together, than the remaining funicular joints. Pronotal spines distinct, shoulders obtusely angulate, no spines between the pronotal and the epinotal spines, the thoracic dorso-lateral angles being rounded and impressed laterally only at the pro-mesonotum and meso-epinotum. Epinotal spines long, acute, deflected upwards apically. Petiole in side view clavate, the node passing smoothly into the pedicel, dorso-lateral margin bearing 3 well developed spines and the posterior margin with a median pair in addition. Postpetiole rounded above, the sides bearing above each a pair of spines of which the posterior is the longer, posterior margin impressed and bearing a pair of small tubercles. Gaster small, the anterior margin transverse, sting long and fine. Legs long and slender, the femora, markedly incrassate.

Dull, the body including gaster shagreened or densely and finely punctate basally, the mandibles and funiculi alone being feebly shining in a bright light; mandibles striate, head striate to striate-vermiculate, becoming reticulate laterally; thorax coarsely and longitudinally vermiculate; pedicel coarsely but more irregularly vermiculate which on the postpetiole may be transverse or longitudinal; gaster finely striate longitudinally.

Pilosity of sparse, scattered, short, truncate hairs and a scanty fine, appressed pubescence which is absent from much of body.

Thorax and pedicel brownish yellow and contrasting sharply with the head and gaster; head blackish brown, becoming yellowish brown anteriorly and on mandibles and scapes; legs proximally as on thorax, darkening to dark brown on the tarsi; first gastric segment dark brown except for an anteromedian yellowish brown spot, other gastric segments much lighter brown.

Cotypes: workers from San Esteban, Edo. Carabobo, Venezuela, March 28, 1940 taken from a bat cave and sent by Mr. Pablo J. Anduze. Cotypes in my collection and to be sent to the Venezuelan science museum.

This unusually striking *Leptothorax* is noteworthy in several respects. It is of very large size and of strikingly contrasting color. The finely sculptured gaster separates it readly from most *Leptothorax*. This species does not appear to be close to the described species and is markedly different from the widespread *echinatinodis*, whose subspecies *spininodis* Emery occurs in the Orinoco Delta (Caño Horobuhu of Rio Araturi, 9.ii-35, N.A.W.)

There appear no striking morphological adaptations to life in the bat cave. The eyes are of normal size and only the thoracic region is pale colored. Similarly, in caves in the Aripo Valley, Trinidad, inhabited by bats and oil birds *(Steatornis)*, I found *Pheidole* and *Strumigenys* ants which also had eyes of normal size and were not unusually pale.

Dendromyrmex

Dendromyrmex apicalis Mann, *filiae*, ssp. nov.

Worker. Extended length 7.6 mm. (thorax 2.7 mm.) Eyes situated closer to the occipital than to the anterior clypeal margin. Head densely punctate, becoming striate-punctate dorsally and posteriorly at the sides; densely and transversely striate-punctate on the thorax and petiole; gaster faintly striate.

Female. Length 11.9 mm. (thorax 4.3 mm.) Sculpturing, pilosity and color as in worker except that reddish brown median blotches appear faintly on the gastric segments.

Described from colonies (Nos. 315, 316.1, .2, .3) found in virgin greenheart forest near the Forest Settlement, Mazaruni River, British Guiana, August 23, 1935. The ants formed carton nests on the undersides of leaves of several plants. The subspecies is dedicated to my daughter, Nancy Beth.

The British Guiana workers were compared with the holotype of a*picalis*. Color and size are similar and they are both superficially shining. My workers, however, have the sides in front of the head more convex, the thorax in profile more evenly convex, the pro-mesonotal suture less distinct (the posterior margin of this in the holotype rises as a slight convexity passing smoothly into the general convexity of the thorax), the petiolar crest distinctly sharper and the anterior face of the node passes into the pedicel without as distinct an angle.

Santschi (Bull. Soc. Vaud. Sc. Nat., 1921, 54:99-100) briefly described the var. *guyanensis* from the worker and female caste collected in French Guiana. The description of the worker differs from the present form in that the eyes are stated to be in the middle of the head and the size 9 mm. The sculpturing is evidently more punctate.

Dendromyrmex chartifex F. Smith.

Worker. Extended length 7.9 mm. (thorax 2.8 mm.) Shiny in appearance because of the shallow punctate-striate sculpturing, which, however, becomes much deeper on the epinotum. Pilosity of numerous long, fine, sinuate, upright hairs scattered generally over entire body and particularly numerous on scapes and legs; long, fine appressed pubescence on gaster. Medium brown; head in front of eyes and frontal carina a contrasting brownish yellow, each gastric segment distinctly paler brown between the sutures.

Described from a colony (Nº 313) found at a height of six feet on *Hirtella paniculata* (Rosaceae) at the Forest Settlement, Mazaruni River, British Guiana, August 22, 1935. The ants had a carton nest on top of live leaves. Mr. H. St. J. Donisthorpe of the British Museum kindly examined a worker of this colony and pronounced it to be similar to F. Smith's type.

Differing from *chartifex* workers from Brazil in smaller size and much darker color, from the var. *felis* Mann cotypes also in color, *felis* being as pale as the typical *chartifex* but dull instead of shiny. *D. felis* is of comparable size but has

much denser and deeper sculpturing. A worker (Nº 748) which I took on Barro Colorado Island, Panama Canal Zone, resembles Nº 313 workers but is generally darker.

Dendromyrmex fabricii Roger *niger*, ssp. nov.

Worker. Extended length 6.7-7.1 mm. (thorax 2.4-2.5 mm.) Densely and deeply punctate on the head and gaster, densely striate-punctate to striate on the thorax and petiole. Pilosity of numerous silvery, long, sinuate reclinate to upright hairs and a long, appressed pubescense which is generally scanty and almost lacking on the gastric dorsum. Black, appendages blackish brown.

Described from workers of a colony (Nº 550) taken on the Surinam side of the Courantyne River, roughly 50 miles above Hepseba, July 9, 1936 by myself.

Differing from Colombia specimens in not having long appresed hairs on the gaster and with more pilosity on the head; the petiole is also drawn out more acutely at the apex. In this latter character differing also from Amatuk, B. G. specimens (Lutz) which have the gastric appressed hairs. Unlike *rufescens* and *picta* workers and with much sparser pilosity, especially of the gastric pubescence, than *io*.

Dendromyrmex fabricii Roger, *isthmicus*, ssp. nov.

Female (Deälate). Extended length 8.8-9.3 mm. (thorax 3.3 mm.) Anterior clypeal margin faintly concave, clipeal median carina conspicuous, continuing posteriorly between the frontal carina as a distinct line; eyes situated closer to the occipital than to the anterior clypeal margin. Epinotum with rounded angles. Petiole in side view with feebly concave anterior and more distinctly convex posterior face, the crest acutely angular, viewed from behind the crest is convex above. Head densely punctate, thorax striate-punctate. Petiole densely striate; gaster finely and shallowly striate-punctate. Pilosity of abundant long, fine, sinuate hairs which are reclinate to upright and an abundant long, appressed pubescence, especially on the gaster.

Dark brown, especially on the head where nearly black; distal funicular segments, legs and pronotum lighter brown; hairs yellowish white, pubescence yellowish.

Cotypes: two females (Nos. 887 and 897) which I took June 29, 1938 on Barro Colorado Island, Panama Canal Zone.

Dendromyrmex fabricii Roger, *io*, ssp. nov.

Worker. Extended length 6.4 mm. (thorax 2.3 mm.) Head, thorax and petiole densely punctate, being conspicuously transversely striate-punctate on sides of thorax and on epinotum and petiole. Pilosity of abundant long, fine, upright hairs; gaster in addition with a long appressed pubescence. Gaster less deeply but densely punctate. Dark brown, the mandibles, cheeks, funicular joints and legs distally, and the coxae markedly lighter brown.

Differing from the typical *fabricii* as found in Panama and Colombia in having a more acute and anteriorly directed petiolar crest, more abundant pilosity, especially of the appressed gastric hairs and in having the anterior part of the head lighter. Differing from var. *rufescens* specimens which are probably cotypes (Tukeit, B. G. - Lutz 1911 coll.) in smaller size and color.

Holotype: one worker (Nº M5631) from the Cuyuwini River, Upper Essequebo, British Guiana, taken by Dr. J. G. Myers November 15, 1935.

RESUMEN

Las hormigas descritas en este trabajo provienen de Venezuela, Trinidad, Guayana Británica, Surinam y de la Zona del Canal de Panamá. El *Pogonomyrmex (Ephebomyrmex)* nuevo de Venezuela es particulamente interesante desde luego que cierra el vacío que existía en su distribución desde Guatemala

al Sur del Brasil, Bolivia y Chile. También se agrega a la Guayana Británica, con el hallazgo en las Sabanas de Rupununi, de otra subespecie muy cercana a la especie venezolana. Las diferencias de los *Ephebomyrmex* de Venezuela y Guayana Británica, como las diferencias de las dos especies de bachacos de las mismas localidades presentan un problema. Parece que los llanos venezolanos al Norte de Ciudad Bolívar y las Sabanas de Rupununi en la Guayana Británica que no están separados por un espacio tan grande ofrecen diferentes nichos ecológicos o han sido separadas por mucho tiempo, por otras barreras. La Sierra de Pacaraima por lo visto puede ser una barrera más importante que los ríos que separan las dos localidades.

El nuevo Leptothorax de Venezuela encontrado en cuevas de murciélagos no parece haber sufrido cambios morfológicos que la adapten a la vida de cuevas. Es de gran tamaño y su colorido y esculturación llama la atención.

Las *Dendromyrmex* que viven en nidos arboreos de cartón seguramente han de encontrarse en Venezuela. Las descritas aquí provienen de Panamá y la Guayana Británica.

R 44

NEW VENEZUELAN MAYFLIES

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Thraulus caribbianus sp. nov.

Male imago (holotype). Body 4½ mm.; wing 5 mm.

Turbinate eyes as in members of the subfamily Baetinae; very large, erect, on thick stalks; upper surface oval, the greatest diameter of eye being transverse, as shown in Fig. 1[a]; color, orange. Lower portion of eye blue-black. Head, thorax, and apical abdominal segments rather dark red-brown. Antennae broken. Black transverse line above lateral ocellus. Dusky streak laterally on pronotum. Mesonotal scutellum yellow, its tip dusky-shaded; lateral areas at sides of mesonotal shield also yellow; scutellum, and anterior half of shield, outlined with black. Legs missing. However, in vial in which all specimens were contained, are several legs which correspond to those of the female subimago of this species. Legs yellow, with wide red-brown apical band on femora. Wings hyaline; brown stain at extreme base of each wing, extending on to membrane only as far as humeral cross vein in fore wing, but slightly on to anal area in hind wing. Venation light red-brown; cross veins paler than longitudinals. In costal stigmatic space, 7 or 8 cross veins; oblique, almost colorless. Hind wing relatively short with acute costal angulation; vein Sc ends at prominent curved cross vein extending from this angulation; venation scanty; see Fig. 1b. First abdominal tergite purplish brown; sternite whitish with some grey shading. Segments 2-6, and base of 7, transparent yellowish white; posterior margin purplish brown, wider and darker on tergites than on sternites; two purplish black dots at stigmatic area,

and another smaller dot on pleural fold nearer anterior margin. Tergites 8-10, and apical half of 7, red-brown; sternites paler, yellowish. Tails missing. Genitalia as shown in in Fig. 2. The penes are quite distinctive, being more like those of some species of Nearctic *Paraleptophlebia* than like *Thraulus*. Also no process is visible between forceps and penes, arising from forceps base, as in most of the New World species of *Thraulus*.

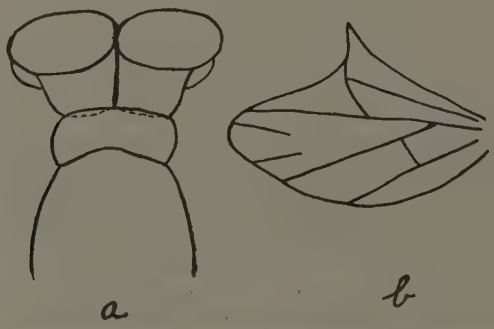

Fig. 1. — *Thraulus caribbianus*. 1a — Head of male, from above (freehand sketch), showing tall turbinate eyes. 1b — Hind wing (freehand sketch.)

Female imago (allotype). Body 4½ mm.; fore wing, tails and legs missing (some of the aforementioned legs probably belong to this specimen). Head grey; purplish black band between eyes. Pronotum yellow, with grey-brown shading; a rose-colored spot at antero-lateral angle; sclerite outlined with reddish black. Prosternum white. Meso- and metanota light red-brown, narrowly outlined in dark brown; lateral areas between wing roots dark brown; mesonotal scutellum yellowish. A rose-colored spot anterior to wing root, two others on pleura below wing root. Pleura yellow with some brown shading. Anterior half of meso-sternum white; posterior half light red-brown. Rose-colored markings also at base of hind wing. Costal angulation of hind wing less acute than in male, otherwise similar. Legs presumably as described for male. Abdominal tergites 1-6, middle area of 7, and all of 9 and 10,

greyish rose. Anterior margin of tergite 2, antero-lateral corners of tergites 1-6, and all of 8 but a narrow rose-colored mid-dorsal line, white. Posterior margins of middle and apical tergites narrowly darker; blackish shading laterally next to pleural fold, on tergites 1-6. Sternites whitish with faint rose tinge; egg valve on 7, and margins of 9th sternite, tipped with orange. 9th sternite quite deeply cleft at apex; extends beyond tip of 10th tergite. Tails missing.

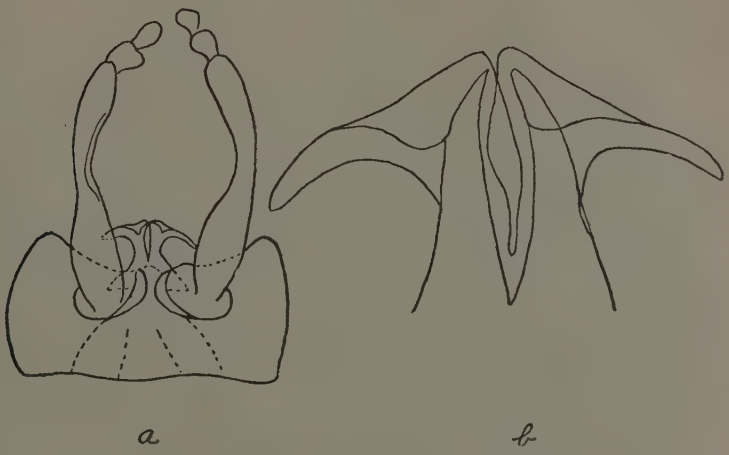

Fig. 2. — *Thraulus caribbianus.* 2a — Male genitalia, showing penes, forceps and basal plate. 2b — Penes, enlarged.

Female subimago. Too teneral to warrant description; dark markings which are present correspond well to those of imago. Important only due to the fact that all three legs on one side are still attached. Yellowish, with wide pre-apical band on femora, which shows indication of extending toward tip of that structure; fore tibia also dark-tipped.

Holotype- Male imago. Antimano, Venezuela, 900 meters; Jan. 13, 1940. Rene Lichy, collector. In private collection of J. R. Traver.

Allotype- Female imago. Same data. In National Museum, Caracas.

Paratype- Female subimago. Same data; in National Museum, Caracas.

In type of hind wing, and in the fact that the appendages of the penes extend laterad, this species seems most nearly allied to *maculatus* Ndhm. and Murphy. The structure of the penes is unique, however, among Neotropical members of this genus.

Leptohyphes nigripunctum, sp. nov.

Male subimago (almost ready to shed cuticle).

Body 4 mm.; wing 4 mm.; tails 10 mm. Head grey above, white below; a pale triangular area between ocelli. Bases of antennae white; filament dusky, tip white. Pronotum yellowish white, shaded with pale grey; narrow pale mid-dorsal and submedian lines; lateral margins with blackish shading and lines, also black margining, leaving several pale areas; heavy shading above leg base. Meso- and metanota quite bright red-brown; mesonotal scutellum faintly grey-tinged. Considerable grey shading on pleura, anterior to wing base and around leg bases. An oblique black line anterior to base of hind leg. Middle area of thoracic sternum rather dark grey. A small but conspicuous black dot at apex of each trochanter. Fore femur yellow; heavy longitudinal dark grey stripes on each side; black line along dorsal crest; indications of interrumpted blackish subapical band. Tibia greyish black; apex, base and margins narrowly pale. Tarsus somewhat paler than tibia; claw almost white. Middle and hind femora yellow streaked with grey and with broken subapical band, but paler than fore femur. Tibia and tarsus immaculate, whitish. Hind wing as in Fig. 3. Faint traces only, of two longitudinal veins; costal projection slightly curved, of moderate length. Fore wing whitish, C, Sc and R; faintly grey-lavendar in basal half; all other veins white. Cross veins numerous. Abdominal segments 2-6 yellowish white, basal and apical segments light reddish brown with yellow tinge; tergum and sternum same color. Pleural area largely pale except for a few very faint grey pencilings. A pale grey transverse band occupies most

of the middle area of each segment, both tergites and sternites, leaving pale areas at anterior and near posterior borders. Posterior margins of all segments narrowly black. Tails whitish, not darker at joinings. Genitalita of the *peterseni* type; unfortunately these were lost while being prepared for mounting.

Fig. 3.—*Leptohyphes nigripunctum.* Hind wing (free-hand sketch).

This species seems most nearly allied to *costaricanus* Ulmer, described from female specimens. Differs from that species as follows: (1) cross veins of fore wing much more numerous; (2) tibia and tarsus of middle and hind legs wholly pale, tibia not darker at base; (3) abdominal sternites not paler than tergites.

Holotype- Male subimago. Antimano, Venezuela. Jan. 13, 1940; 900 meters. R. Lichy, collector. In National Museum, Caracas.

Tricorythodes lichyi sp. nov.

Body of male 3-4 mm.; wing 4½ mm. (dried specimens). Male imago (holotype). Body 3½ mm.; wing 4½ mm.

Antennae broken; brownish at base. Head, pronotum and mesonotum very dark red-brown; mesonotum shiny, quite sharply set off from the pale red-brown pleura adjoining. Pronotum duller, blackish brown. Patches on pleura, and areas on each side of mid-line of meta-sternum, somewhat brighter red-brown. Wings hyaline; in some lights a very faint pale smoky tinge is evident, most noticeable near apex and along margin. Venation distinct. Longitudinal veins blackish, paler in cubital and anal regions; Sc and R most heavily colored, with distinct infuscation in narrow area on each side of each

vein. Cross veins in third and fourth spaces likewise distinctly blackish; costal cross veins near bulla paler, but distinguishable; all others pale. All femora rather pale red-brown, with some paler streaking. Knees (extreme base of tibia) distinctly blackish. Fore tibia pale smoky brown at base, becoming paler apically; narrowly black-margined on ventral edge. Fore tarsus pearly grey, brownish at tip of distal joint; very narrow black line at each joining and along ventral edge. Middle and hind tibiae concolorous with femora; tarsi slightly paler at base of joints, and reddish brown at distal ends; joinings as in fore leg. Ground color of abdomen pale yellowish to reddish brown; basal and apical tergites and middle area of middle tergites heavily shaded with black; all joinings narrowly paler. 9th sternite with yellowish apical triangle; basal portion shiny red-brown, slightly darker than 8th. Forceps base with moderately deep excavation apically. Tails hyaline whitish; basal joints smoky grey; margins and joinings of lateral tails narrowly blackish, and of middle tails red-brown, in basal half, becoming paler apically.

Female imago (allotype). Body 4 mm.; wing 5½ mm.

Head and thorax rather dark red-brown, only slightly paler ventrally. Legs light red-brown; knees black; fore tibia shaded with smoky. Wing faintly grey-tinged thruout; apical costal space and entire outer margin more distintctly shaded with grey. All veins more distinct than in male; black. Sc and R more widely infuscated on each side. Abdomen (filled with eggs) light red-brown; tergites blackshaded as in male; joinings of middle tergites red-brown. Apical margin of 9th sternite truncate. Tails light red-brown; joinings blackish.

Male paratypes. Considerable variation in coloring, ranging from specimens as dark as holotype to those which are distinctly paler red-brown on legs, thorax and abdomen, with little difference in color between mesonotum and pleura; abdominal tergites less heavily dark-shaded. In many paratypes, the middle tail is dark-margined like the laterals. Wing membrane varies from untinted hyaline to pale red-brown tinge thruout entire wing. Antennae brown basally, tips silvery white. Specimens in alcohol show a distinct whitish trans-

verse band near base of fore femur, and large pale areas or thorax: anterior to wing root, between middle and hind leg bases, and on sternum between bases of hind legs. Large yellowish area on each side of and anterior to mesonotal scutellum. A large squarish yellow area surrounds base of middle leg; included within this area is one small dark brown sclerite. Head bright red-brown, not shaded with black; pronotum definitely shaded and marked with black. Costal margin of wing distinctly grey-tinged; outer margin distinctly smoky except in anal area.

This species seems rather closely allied to the Nearctic species *fictus* Trav. Differs by its smaller size; more distinct red-brown markings on thoracic sternum; less black shading on thoracic pleura; less extensive pale intersegmental abdominal markings; more extensive light area on 9th sternite; smoky tinges on wing membrane. It is paler and smaller than *explicatus* (Etn), the only Neotropical species thus far described.

Holotype- Male imago. Antimano, Venezuela; 900 meters; Jan. 13, 1940. R. Lichy, collector. In private collection of J. R. Traver.

Allotype- Female imago. Same data. In National Museum, Caracas.

Paratypes- 33 male imagos, same data. 12 of these in private collection of J. R. Traver; remainder in National Museum, Caracas.

Baetis alcyoneus sp. nov.

Male imago (holotype). Body 4 mm.; wing 4 mm.

Upper part of body light red-brown, venter paler, whitish. Head, antennae, dorsum of thorax to a dividing line above leg bases, and apical abdominal segments, light red-brown. Turbinate eyes large, on short thick stalks; upper surface oval, the two eyes not quite contiguous; pale orange. Lateral margins of pronotum, sutures of meso- and metanota and of pleura, dark brown; pale yellowish square area around base of fore

wing; short longitudinal streak laterally on basal half of metanotum. Slight dusky shading anterior to fore wing. Thoracic sternum pale creamy white, sharply marked off from the reddish upper portion. Legs missing. Wings hyaline; longitudinal veins light brown, cross veins paler. Stigmatic area milky white; four oblique cross veins, of which two are incomplete. Marginal intercalaries paired; of moderate length; none in first interspace, those of second interspace very short. Hind wing narrow, somewhat pointed at apex; with but two longitudinal veins and no traces of cross veins; costal angulation short, acute, as shown in Fig. 4b. Abdominal segments 2-6 semi-translucent; tergites pale olive brown, sternites creamy whitish. Apical segments light red-brown, sternites paler than tergites. Posterior margins of all tergites narrowly dark purplish brown. Smoky shading in antero- and postero-lateral angles, parallel to pleural fold, and forming a mid-dorsal triangle in apical half of tergite 3. Black parallel tracings along pleural fold; small dark circle at each stigma. Tails missing. Genitalia broken except basal portion, which is shown in Fig. 4a.

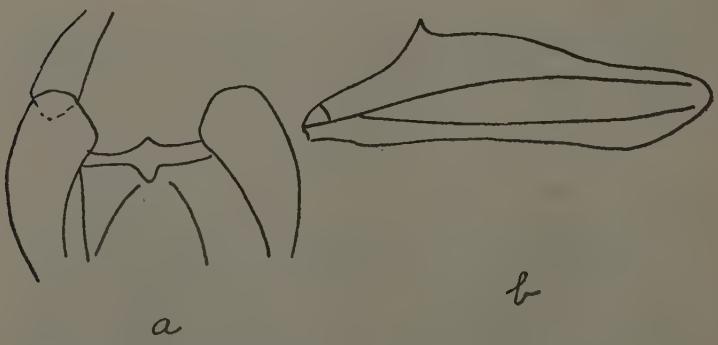

Fig. 4. — *Baetis alcyoneus*. 4a — Male genitalia (one entire forceps missing, likewise tip of the other). 4b — Hind wing.

Female imago (allotype). Body 5 mm.; wing 5 mm. Very similar to male. Head slightly paler than dorsum of thorax. Dorsum of abdomen concolorous with thoracic dorsum when eggs are present, elsewhere pale fawn-colored. Sternites 6-10 paler fawn-colored than dorsum; sternites 1-5 pale yellowish white. Dark posterior margins of tergites less conspicuous than in male, in most tergites, do not attain mid-dorsal line. Femora yellowish white, tibiae and tarsi amber- tinged. Narrow dark longitudinal streak the length of fore femur. All joinings very narrowly darker. Venation somewhat darker than in male, all cross veins better defined. Three or four complete stigmatic cross veins. No marginal intercalaries in first two interspaces.

Holotype- Male imago. Antimano, Venezuela, 900 meters; Jan. 13, 1940. R. Lichy, collector. In private collection of J. R. Traver.

Allotype- Female imago; same data. In National Museum, Caracas.

Paratype- Female imago; same data. In National Museum, Caracas.

This species seems quite closely allied to *tantillus* Ndhm. and Murphy; related also to *dryops* Ndhm. and Murphy, and to *inops* Nav., by characters of the hind wing. Differs from the first mentioned, of which only the female is known, by reason of its somewhat larger size, lack of any traces of cross veins in hind wing, and slight differences in longitudinal veins of that wing. Type material of *tantillus* shows no indication of the sharp dividing between dorsum and venter, which is so pronounced in *alcyoneus;* body 3¾ to 4mm., (females), wing 4 mm. in each specimen. Lower of the two longitudinal veins in hind wing, in *tantillus,* slightly shorter than upper, not quite reaching apex of wing.

Pseudocloeon anduzei sp. nov.

Male imago (holotype). Body 4 mm.; wing 4 mm.

Turbinate eyes very large, erect, almost contiguous apically; upper surface almost round; light red-brown, somewhat darker in basal half of stalk. Lower portion of eyes purplish black. Antennae whitish; two basal joints with narrow dark rings at apices. Head and thorax clear yellow. Outlines of mesonotal shield and margins of pleural sclerites light amber-brown; paler whitish areas anterior to base of middle leg. Legs yellowish white. Tip of femur, a small dot at apex of tibia, and apical margin of trochanter, narrowly brownish; tarsal joinings very slightly smoky. Short inconspicuous reddish streak near apex of femur. Fore tibia about one and one-third as long as femur; tarsus slightly longer than tibia. Long second tarsal joint almost equal to third and fourth combined. Basal tarsal joint of hind leg almost as long as the three following joints combined this joint somewhat less than half the length of the hind tibia.

Wings hyaline; venation light brown; costal margin at base dark brown; same color extends a short distance on veins Sc, R and Cu, and on arcuate brace at base of anal veins. Two series of cross veins and a third incomplete series nearer wing base. Three complete stigmatic cross veins, slightly oblique. No marginal intercalaries in the first two interspaces behind costal space; two such intercalaries in most other spaces as far as cubitus, altho in some spaces but one may occur. Abdomen transparent white, apical segments yellowish. Inconspicuous thin dark penciling directly above pleural fold; narrow brown dash on posterior margins of pale segments, on each side only, not reaching mid-dorsal line. Tails missing, on holotype. On one of the paratypes, these are whitish, very faintly smoky at base, not darker at joinings. Genitalia as shown in Fig. 5[a] and b.

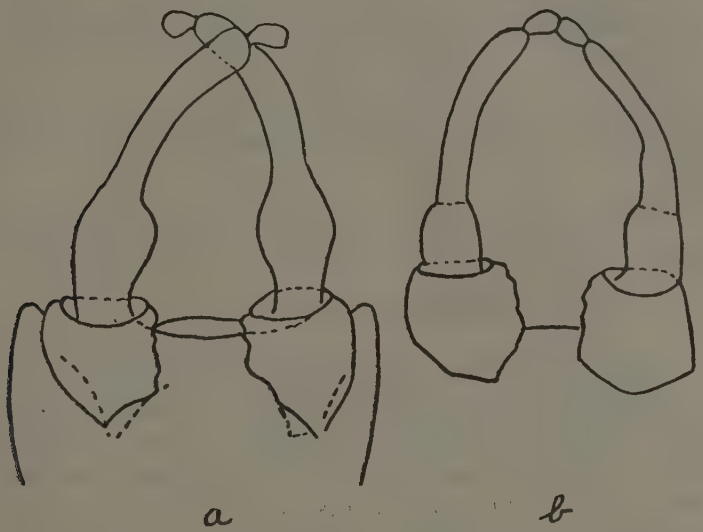

Fig. 5. — *Pseudocloeon anduzei.* Male genitalia. 5a — Holotype (red-eyed specimen). 5b — Paratype (white-eyed specimen).

Male paratypes similar, except that the turbinate eyes are paler almost flesh-colored. Tails 10 mm. in length.

The large turbinate eyes and the lengths of the leg joints are reminiscent of the Puerto Rican genus *Cloeodes,* which is distinguishable from *Pseudocloeon* mainly on nymphal characters. Note that the genitalia bear some resemblance to those of *C. maculipes,* the type of the genus *Cloeodes,* except for the swollen area at base of the long forceps joint. It is quite possible that the genus *Cloeodes* may occur in South America and this and some species now placed in *Pseudocloeon* should be transferred to it. Genitalia rather similar also to *turbinops* Ndhm. and Murphy, which is a smaller brownish species from British Guiana.

Holotype- Male imago. Antimano, Venezuela; 900 meters; Jan. 13, 1940. R. Lichy, collector. In private collection of J. R. Travers.

Paratypes- Two male imagos, same data; one of these in private collection of J. R. Traver, the other in Nat. Mus., Caracas.

Additional specimens: four male and four female subimagos, teneral.

Pseudocloeon arawak sp. nov.

Male imago (holotype). Body 3½ mm.; wing 3½ mm.

Turbinate eyes moderately large, erect, upper surfaces almost round, not contiguous apically; yellowish orange in color. Lower portion of eyes purplish black. Antennae broken; basal joints pale red-brown. Head, thorax and apex of abdomen light red-brown. Somewhat paler areas on pleura, at bases of legs and wings. Posterior half of mesonotal shield narrowly outlined in yellow, which in turn is margined with dark brown. Scutellum outlined with dark brown; an oblique brown line laterally on metanotum, above leg base. Metasternum somewhat paler red-brown, other parts of sternum concolorous with dorsum. Legs missing. Wings hyaline; venation yellowish, cross veins very indistinct. Brownish stain at extreme base, extending a short distance out on veins C, Sc, and R. Stigmatic area faintly milky; cross veins there very indistinct, but three can be made out with difficulty. No marginal intercalaries in first interspace behind costal space, on one wing, but on the other a single short stub is present. From here to cubitus, intercalaries paired, moderately short. Abdominal segments 2- 6 and base of 7 white, translucent; tiny blackish stimatic dots on pale segments are the only markings. Tails missing. Genitalia as in Fig. 6.

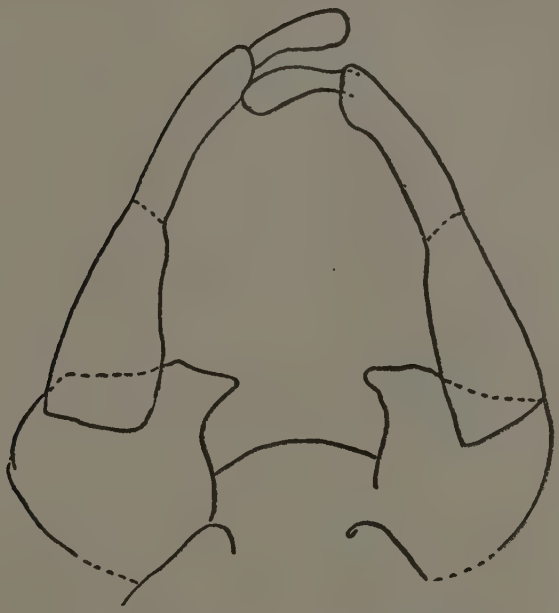

Fig. 6. — *Pseudocloeon arawak.* Male genitalia.

A teneral male subimago is probably of the same species. It is not possible to determine whether or not any of the several females of this genus may belong with the above males.

Holotype- Male imago. Antimano, Venezuela; 900 meters; Jan. 13, 1940. R. Lichy, collector. In private collection of J. R. Traver.

This species is smaller than any others thus far described in the South American fauna, except the brownish *turbinops* Ndhm and Murphy from British Guiana and the yellowish *bruchi* Nav. from Argentina.

The inward-projecting process at base of forceps is unlike that of genitalia of any other species figured from South America.

Pseudocloeon venezuelensis sp. nov.

Male imago (holotype). Body 2¾ mm., wing 2½ mm.

Turbinate eyes of male cylindrical, erect, diameter at top slightly greater than at the bottom; each eye slightly taller than one-half the greatest width of head (including basal portion of eye). These tall turbinate eyes are reminiscent of *P. binocularis* Ndhm. and Murphy, a Peruvian species in which the eyes are considerably taller, and body and wing almost twice the size of the present species. At base, turbinate eyes are orange, becoming yellow in apical half. Head yellow; bases of ocelli and markings on frontal margin, red-brown; basal portion of eyes black. Basal joints of antennae light red-brown; filament slightly paler. Thorax red-brown dorsally, prothorax somewhat paler than other parts; quite extensive yellow areas on pleura around leg and wing bases, and anterior to middle leg. On pronotum, lateral margins and a transverse narrow line near middle of sclerite, black; black line at base of fore leg; scutella and margins of meso- and meta-nota outlined with black. Near lateral margin of metanotum in basal half, a longitudinal yellow streak. Thoracic sternum paler than dorsum; prosternum outlined in black. All coxae red-brown. Fore leg whitish, tip of tibia faintly smoky; other legs missing. Wing hyaline; dark brown at extreme bases of C, Sc and R, and on membrane basad of other longitudinal veins. Longitudinal veins pale brown; cross veins and intercalaries colorless. Very faint milky tinge in apical half of stigmatic area, in costal and subcostal spaces. 2 or 3 comlete, and 3 to 4 incomplete stigmatic cross veins, all somewhat oblique. In first seven interspaces behind costal space, marginal intercalaries wholly lacking, or if present in fourth and seventh space, very short; none in cubital or anal areas. In remaining marginal area, intercalaries paired, moderate in length; in each of the interspaces next behind R_5 may be single or paired. Abdominal tergites 2-6 silvery white, translucent; apical segments red-brown, slightly paler than thorax. Segment 1 largely pale reddish, but posterior margin of tergite and area behind hind leg, white. A double black wavy line longitudinally along pleural fold, on pale

segments; most distinct over stigma. Faint brownish shading in antero-lateral angles on pale tergites, extending a short distance along anterior margin. Tails missing. Genitalia as shown in Fig. 7. Note the very short median spine on apical margin of subgenital plate.

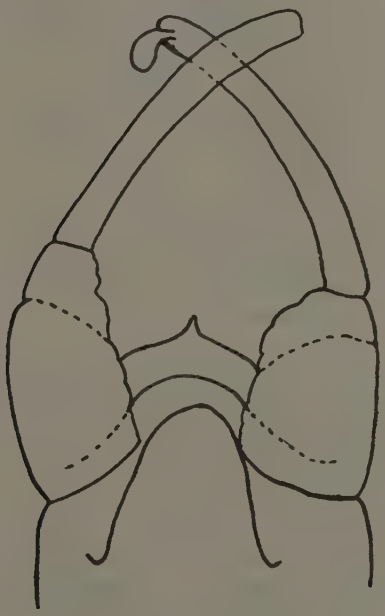

Fig. 7. — *Pseudocloeon venezuelensis.* Male genitalia.

Male subimagos too teneral to show any color patern.

Female imago (allotype). Body 2¾ mm., wing 2½ mm.

Head and thorax light yellowish brown. Eyes and ocelli black. Antennae yellow. A wide transverse band, pale red-brown, occupies most of pronotum. Mesonotum outlined in brown; a brown patch on each side, in posterior region; darker brown triangular area on each side of scutellum. Metanotum also narrowly dark-margined; whitish lateral streaks

in basal half, as in male. Brown markings on pleura above leg bases. Legs yellowish. Wings much as in male, but longitudinal veins slightly more distinct. Marginal intercalaries lacking from first four interspaces, but in 5 and 6 one or two very short ones may be present, and a pair of short ones in seventh space. Abdomen dorsally pale rosy brown, where no eggs remain; eggs deep orange. Anterior margins of tergites narrowly pale, so that abdomen appears slightly banded. Slightly paler ventrally. Tails missing.

Holotype- Male imago. Antimano, Venezuela; 900 meters; Jan. 13, 1940. R. Lichy, collector. In private collection of J. R. Traver.

Allotype- Female imago; same data.

Paratypes- One male and two female imagos. Same data. One female in private collection of J. R. Traver, others in National Museum, Caracas.

In genitalic type, this species seems allied to *brunneum* Esb. Pet. Has turbinate eyes of the *binocularis* type; smaller and paler than either of these species. Smaller than any described species except *bruchi* Nav.

Baetodes spiniferum sp. nov.

This genus was described from a peculiar Brazilian nymph, *B. serratus* Ndhm. and Murphy. The adult is not known. The following specimens are believed to represent this unknown adult stage, because: (1) of the presence of mid-dorsal abdominal spines on tergites 2-5, a feature of the nymph of *serratus*; (2) of the very long tibia, a joint which is also long in the nymph of *Baetodes;* (3) of the fact that the above characters plus lengths of leg joints do not fit into the pattern of *Pseudocloeon* or *Cloeodes,* the other two genera of Baetines possessing paired intercalaries and lacking hind wings. The species is too small for *serratus.* An undescribed species of *Baetodes* nymph from Mexico, collected by Dr. Lewis Berner, is nearer the size of this adult, and differs

from *serratus* in color pattern, size, and in the presence of gill filamente at the bases of the legs. It is probable that the genus *Baetodes* is rather widely distributed in the neotropical region.

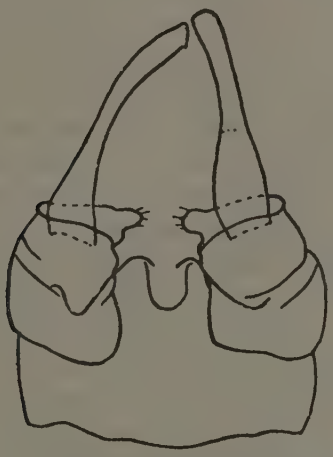

Fig. 8. — *Baetodes spiniferum.* Male genitalia.

Male imago (holotype)- Body 4 mm.; wing 4 mm.; tails broken at 3½ mm. from body. General color reddish (chestnut) brown, with purplish shading. Turbinate eyes very large, cylindrical, erect; apical surface round; eyes contiguous apically; reddish in color. Lower portion of eyes purplish black. Antennae light red-brown; basal half of second joint paler. Head and thorax bright red-brown, only slightly duller ventrally and on pleura. A rather wide black band at anterior margin of pronotum. Darker brown triangular shading on lateral portions of pronotum, and on mesonotum anterior to wing root. Scutella of meso-and metanota outlined with black; a short yellowish median streak directly anterior to mesonotal scutellum. Sclerites at bases of legs and wings outlined with

black. Coxae and trochanters red-brown with some dull purple shading; femora yellowish or greenish brown, with wide red-brown band slightly toward apex from middle; extensions of this band reach apex of segment along upper crest of fore and hind legs, and on lower margin also, of hind leg. Tibiae whitish, fore tibia yellowish, faintly smoky at apex. Tarsi smoky yellow-brown. Fore tibia more than twice as long as femur; tarsus short, subequal to femur; second tarsal joint about as long as third and fourtth combined. Fore leg fully as long as body. Hind tibia about one and one-third times as long as femur; tarsus very short, about half the length of the femur; basal joint equal to the next two joints combined. Wings hyaline; venation pale yellowish brown; red-brown stain at extreme base, extending a short distance on to veins C, Sc, and R. Faint milky tinge in stigmatic area, where are 2 (or 3) complete oblique cross veins and traces of 2 or 3 others, incomplete; the latter may be connected by longitudinal bars. Cross veins in disc of wing very fine, inconspicuous. No marginal intercalaries in first interspace behind costal space; beyond this as far as cubitus, a pair of intercalaries in each interspace, well developed and moderately long. Apical abdominal segments red-brown with distinct yellowish tinge; basal and middle segments paler, greyish yellow with considerable purplish brown shading across most basal segments and in central area of middle ones. Short mid-dorsal spines occur on tergites 2-5, between middle of segment and its posterior margin; these slant slightly to rearward. Posterior margin of tergite 1 is uprolled in median area, to form a sort of carina, in the hind portion of which is a tiny projection that may represent a spine. Posterior margins of all tergites darker, these bands widest on basal segments. Dusky purplish border along pleural fold. Basal and middle sternites smoky brown, somewhat darker than ground-

work of corresponding tergites; apical sternites concolorous with tergites. Basal sternites slightly darker on posterior margins; middle ones with small pale antero-lateral streaks. Tails dusky, joints *very* narrowly but indistinct darker at joinings (tails do not, however, appear annulated). Genitalia as shown in Fig. 8.

Female subimago. Body 4½ mm.; wing 4½ mm.; tails 10 mm.

Head yellow. Thorax and abdomen red-brown, almost as bright in certain areas as in the male. Similar black band at anterior margin of pronotum. Suture between pro-and mesonota black; sclerites of pleura black-brown. Smoky brown and purplish shading anterior to fore wing and between leg bases. Mesonotal scutellum and area just anterior to it, yellowish; middle of mesonotal shield outlined by yellow lines; dark shading across anterior margin of mesonotum. Scutella of meso-and metanota outlined with black. Wide black longitudinal line on metathorax, above leg base. Thoracic sternum shaded with smoky purple; sutures black. Fore legs missing. Middle and hind legs yellowish; femora very heavily shaded with purplish brown. Tibia of hind leg about one and one-third as long as femur; tarsus very short, about one-fourth as long as femur. Wings with yellowish cuticle of subimago; cross veins indistinct. Small brown spot at base of Sc and R; intercalaries as in male. Basal tergites and all sternites shaded with purplish brown; middle tergites shaded only along middle line. Posterior margins of all segments narrowly darker, but joinings paler, yellowish, so that abdomen appears somewhat banded. Black line along pleural fold; somewhat paler irregularly oval marks over stigmatic areas, on middle and apical tergites. Tergite 10 paler, its middle area largely yellowish. Mid-dorsal spines present but less well-defined than in male. Tails yellow, not darker at joinings. Apical margin of 9th sternite truncate, not prolonged backwards.

Holotype- Male imago. Antimano, Venezuela; 900 meters; Jan. 13, 1940. R. Lichy, collector. In private collection of J. R. Traver.

Allotype- Female subimago, same data. In National Museum, Caracas.

RESUMEN

Se describen por primera vez ocho especies de Ephemeridos de Venezuela provenientes todas de Antímano, D. F., coleccionadas por R. Lichy. Son todos ejemplares relativamente pequeños.

NOTAS SOBRE ENTOMOLOGIA MEDICA VENEZOLANA

I.—Flebetomos Transmisores de Leishmaniasis Tegumentaria en el Valle del Yaracuy

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—

Durante los años 1936-1940 tuvimos la oportunidad de realizar, en un sector del Estado Yaracuy (Venezuela), algunas investigaciones en relación con la parasitología, epidemiología y clínica de la Leishmaniasis tegumentaria en dicha zona. Es una enfermedad muy frecuente en áreas rurales de aquella región, en donde se la observa revistiendo aspectos clínicos muy diversos. No es posible considerar aquí tales aspectos, así como tampoco entrar en detalles acerca de su diagnóstico parasitológico. Ellos han sido tratados por nosotros extensamente en trabajo que publicamos hace algún tiempo (1). Sólo queremos informar sobre los posibles agentes vectores de esta protozoosis en el área citada, especialmente en lo que concierne al papel de los *Phlebotomus* en la trasmisión de la dolencia.

La zona endémica de Leishmaniasis tegumentaria en el Valle del Yaracuy, cubre un sector de intensa vegetación, presentando gran humedad durante la época de las lluvias por desbordamientos del río Yaracuy y algunos de sus afluentes. Estas condiciones son óptimas para el desarrollo de insectos hematófagos que integran una rica fauna entomológica. Los pobladores de estos lugares se ocupan habitualmente de trabajos agrícolas consistentes en siembras de conucos y otros frutos en las inmediaciones de sus viviendas.

La fauna entomológica de esta región ha sido estudiada en parte por el que escribe y durante nuestras investigaciones sobre Leishmaniasis tegumentaria tomamos mucho interés en conducir estudios sobre los *Psychodidae* del género *Phlebotomus,* vectores reconocidos de Leishmaniasis en otros países.

La colecta de *Phlebotomus* en estado larvario fué sumamente laboriosa. Sabemos la dificultad, por no decir la imposibilidad, de obtener dichos insectos durante este estadio evolutivo. Ejemplares adultos, sinembargo fueron fácilmente capturados. Las siguientes especies de *Phlebotomus* pudieron ser identificadas en el material coleccionado:

Phlebotomus longipalpis Lutz & Neiva, 1912.
Phlebotomus migonei, França, 1920.
Phlebotomus intermedius Lutz & Neiva, 1912.
Phlebotomus davisi Root.
Phlebotomus maracayensis Núñez Tovar, 1924.

Con excepción de *P. maracayensis,* que fué capturado por nosotros en un gallinero, las especies restantes fueron atrapadas en viviendas de la región, alimentándose en personas portadoras de lesiones leishmánicas. Una especie, *Phlebotomus migonei,* fué además capturada empleando cebo animal (perro).

Lotes de estos *Phlebotomus* fueron dilacerados en suero fisiológico para la investigación de *leptomonas* en su tractus digestivo, con miras a estudiarlas comparativamente con las formas flageladas de varias cepas del protozoario *(Leishmania tropica var. brasiliensis)* aisladas en medios de cultivo (Medios N. N. N., Noguchi, etc.), provenientes de las lesiones cutáneo-mucosas de las personas enfermas. No fué posible hacer inclusiones de los insectos en parafina para cortes y coloración de la faringe, según recomiendan algunos autores (2).

En *Phlebotomus migonei, Phlebotomus longipalpis* y *Phlebotomus davisi,* encontramos siempre un tipo de *leptomona* muy similar a los parásitos de igual forma desarrollados en los cultivos del protozoario a partir de lesiones tegumentarias del hombre.

En preparaciones coloreadas según Giemsa, estas leptomonas eran cortas, relativamente anchas, con una longitud aproximada de 5 micras. El blefaroplasto, situado cerca del núcleo principal, daba nacimiento al flagelo que era inicialmente intraprotoplasmático para continuarse luego en flagelo libre. Formas redondas y en división binaria, algunas de ellas flageladas, fueron también evidenciadas. Observamos también leptomonas muy finas con extremidades afiladas, en las cuales el blefaroplasto estaba situado a cierta distancia del núcleo principal, cerca de la extremidad anterior del cuerpo. En todos los parásitos estudiados, el blefaroplasto tomaba una coloración violeta intenso, casi negro. El núcleo principal, más pálido, se coloreaba en rojo claro.

Aunque experimentalmente no hemos podido realizar investigaciones acerca de la infección de *Phlebotomus* de cría con cepas locales de *Leishmania tropical brasiliensis,* concurren en nuestro hallazgo una serie de hechos que permiten tentativamente considerar a los *Phlebotomus* encontrados con infección natural como posibles vectores de Leishmaniasis tegumentaria en la zona antes descrita. Conocemos que en el interior de muchos arthropodos se han comprobado flagelados con la morfología de leptomonas, sin que se haya podido demostrar la conexión de estos parásitos con la existencia de lesiones leishmaniásicas del hombre o de los animales. Pero muchas veces este hallazgo se ha registrado en zonas donde la Leishmaniasis tegumentaria o visceral reviste un carácter endémico. Es por tanto muy sospechoso encontrar infecciones naturales de *Phlebotomus* con leptomonas en áreas donde existan portadores naturales del parásito *Leismania tropica o donovani.* En nuestro caso, los *Phlebotomus* provenían de una zona hiper-endémica de Leishmaniasis tegumentaria y comprobamos en ellos una marcada tendencia hacia el hombre como fuente de alimen-

tación. Por otra parte, dichos hematófagos se encontraron alimentándose en personas infectadas, por lo que es muy verosímil que las leptomonas descritas arriba representen en invertebrado una fase de un parásito de vertebrado. El hecho de que *P. migonei* fuera también capturado alimentándose en perros, refuerza nuestra opinión, ya que también pudimos comprobar la presencia de ulceraciones leishmaniásicas en estos animales que como en otros países constituyen en la región reservorios extra-humanos del protozoario.

SUMMARY

The author has found, in *P. migonei, P. longipalpis* and *P. davisi,* captured in an area of the valley of the river Yaracuy, where Tegumentary Leishmaniosis is endemic, the existance of leptomonads morphologically identical with the flagelate forms of *Leishmania tropica* var. *brasiliensis* from laboratory cultures. Taking into account the connection between the bloodsuckers and persons having Leishmania ulcers, their androphilic preferences and the study of the morphology of the protozoan which they carried, it is considered possible that these species are the natural vectors of the disease in the region.

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(2) Adler, S. and Theodor, O. (1926). — Further Observations on the Transmission of Cutaneous Leishmaniasis to man from Phlebotomus papatasi. An. Trop. Med. and Parasit, XX: 2, pp. 175-194.

R47

DOCUMENTS POUR SERVIR A L'ETUDE DES SPHINGIDAE DU VENEZUELA (Lepid., Heter.)

UNE ABERRATION DE Protambulyx strigilis L.

par

René Lichy.

5 Parque Sanabria,

Caracas.

—

Voici la description d'une intéressante aberration, pour laquelle je propose le nom de **turarem** *aber. nov.*

♂ : Longueur de l'aile antérieure, de la racine à l'apex: 52½ mm.; envergure: 106 mm.; spiritrompe: 29 mm.

La forme des ailes est analogue à celle de *strigilis* typique. Sur les ailes antérieures, les dessins et leur disposition n'offrent pas non plus de différence; mais ce qui est frappant, c'est le coloris de *toutes* les taches et bandes qui, au lieu d'être vert olive plus ou moins sombre, est nettement orangé (couleur cuir, tan, N° 201) [1]. Si le fond des ailes est également plus clair, c'est parce que les minuscules écailles vert olive, qui couvrent les ailes de *strigilis strigilis,* sont remplacées ici par des écailles jaune orangé. Les nervures qui sont soulignées de gris vert chez *strigilis* normal — surtout les nervures 3 et 6 — le sont par du jaune foncé chez *turarem.* La tache violacée de l'angle interne des ailes antérieures, est semblable à celle de *strigilis strigilis,* mais les courtes lignes parallèles qui la traversent, sont orangées et non vertes.

(1) *cf.* "Code Universel des Couleurs" de J. Seguy, Paris, 1936.

Les ailes postérieures n'offrent aucune autre particularité que des bandes carminées plus claires — mais ce n'est pas un caractère exclusif à cette aberration; la couleur foncière de ces mêmes ailes est, comme chez *strigilis strigilis*, orangé vif.

Le front, les ptérygodes, une partie du métathorax, la ligne dorsale longitudinale et les traits obliques des segments abdominaux, ainsi que le dessus du segment anal, sont également orangés; la tonalité foncière de la tête, du thorax et de l'abdomen est plus fauve.

On peut observer une même échelle de dégradation, entre les diverses nuances du coloris aberrant orangé de *strigilis turarem*, et les nuances du coloris normal vert olive de *strigilis strigilis*.

Les dessins et le coloris du dessous des ailes et du corps s'accordent avec la forme typique.

B. P. Clark a décrit, en 1931, une sous-espèce: *portoricensis*, qui ne diffère pas en couleurs de *strigilis strigilis*. L'aberration *rubripennis* Btl. existe également au Vénézuéla, mais elle est differente de *turarem aber, nov.* Je ne connais aucune autre forme décrite de *strigilis*, ce qui me porte à croire que l'aberration faisant l'objet de cette étude, n'a pas encore été observée.

Cette aberration est remarquable et unique parmi les 125 spécimens de ma collection. Ce n'est pas une forme locale, ni saisonnière. En effet, j'ai pris, la même nuit, six autres exemplaires *strigilis* absolument normaux. Il ne s'agit pas non plus d'un papillon décoloré, ni même frotté, car ce sphinx est absolument frais — son coloris particulier m'a immédiatement intéressé au moment même de sa capture.

Cette modification chromatique est probablement due à un changement du régime alimentaire chez la chenille, ou à une influence particulière et anormale, subit par la chrysalide au cours de sa diapause.

D'après mes observations, il ne semble pas exister de formes de transition.

C'est dans les forêts vierges du versant nord de la Cordillère du Littoral, sur les hauteurs de Choroní, vers 1.600 m. d'altitude, que j'ai capturé *turarem*. En cette nuit du 28 août 1940, les montagnes où je campais étaient couvertes d'un brouillard intense. Le phototropisme positif chez les *SPHINGIDAE*, était alors un fait vraiment unique! Sans interruption, du début de la nuit jusque vers 3 h. 30, plus de 220 sphinx, représentant exactement 20 espèces différentes, sont venus, volant en flèche, irrésistiblement attirés par l'éclairage de deux fortes lampes à essence. Ce fut une vraie chasse miraculeuse!...

Chez les *SPHINGIDAE*, il y a quelques espèces qui se présentent sous deux formes de coloris différents. Je pourrais citer pour le Vénézuéla, les formes vertes ou brunes de *Pholus vitis*, de *Hemeroplanes parce*, de *Hemeroplanes calliomenae*, mais, comme elles semblent aussi communes les unes que les autres, elles n'ont pas, pour cela, reçu de nom. Ce n'est évidemment pas le cas de *P. strigilis turarem*, qui est vraiment le fait du hasard, parmi tant de *strigilis* typiques, qui proviennent de lieux différents du Vénézuéla septentrional, depuis les montagnes de Naiguatá (D. F.) jusqu'aux forêts du río Borburata (Carabobo), du niveau de la mer jusqu'aux sommets de 2.000 m., et aussi de quelques exemplaires généreusement donnés par mon excellent ami P. J. ANDUZE, et rapportés par lui de Ciudad Bolívar (20 m. d'alt., Guyane vénézuélienne), et du Vénézuéla oriental (Caripito, très basses altitudes, Est. Monagas; Campo Claro, 150 m. d'altitude, Est. Sucre).

1 ♂ (H.T.), ma collection. Montagnes de Choroni (1.600 m. d'alt., Est. Aragua), 28-VIII-1940.

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cf. également les ouvrages cités dans l'étude précédente sur les *Sphingidae in* "Bol. Ent. Venez. Caracas, Vol. II, 31-III-43, Nº 1, p. 15

ERRATUM

Dans mon article précedent, sur *Amplypterus tigrina simera* (*in* Bol. Ent. Venez. Caracas, Vol. II, 31-III-43, Nº 1, p. 1), la dernière ligne a été omise; au bas de la première page, ajouter ceci:

"Spéc. Gén. Lép. Hét." (p. 187, 1875), Boisduval, qui n'a cer-

COLOR VARIATION IN THE AMERICAN SOCIAL WASP, *POLISTES CANADENSIS* (LINNAEUS).

WITH DESCRIPTIONS OF TWO NEW FORMS (HYMENOPTERA, VESPIDAE)

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In my introductory study of Nearctic *Polistes* (1940, Jl. New York Ent. Soc., XLVIII, pp. 7-13), I proposed a tentative arrangement of the several color variations of *P. canadensis* (Linnaeus). I have since described one more variety and received two additional ones, the first from Mr. Pablo Anduze, in Venezuela, the second from Mr. F. Schade, in Paraguay. A more careful study of some of the forms, based on more abundant material, has led me to modify some of my earlier views and enabled me to fill in gaps in the known distribution.

Structural Specific Characters. — *Female and Worker: P. canadensis* is a medium-sized to large species, with a long and slender abdomen, elongate-fusiform and much pointed apically, the sixth segment compressed from the sides. First tergite elongate-triangular seen from above, narrower at apex than long in the middle, in profile gradually sloping and slightly convex toward the base. Head about as high as wide, moderately swollen, seen from above about twice as wide as long, the upper outer orbits as bulging as the eyes but much longer. Vertex and upper two-thirds of outer orbits (cheeks) separated from the occiput by a fine carina; edge of lower third

to two-fifths of outer orbit blunty rounded to the gula. Oculo-malar space nearly one-fourth of the length of the eye. Clypeus irregularly heptagonal in outline, wider than high, contiguous to the eyes for a short distance (about two-thirds of the length of the oculo-malar space); two apical margins converging to a very obtuse angle, the apex scarcely projecting and broadly rounded off; upper, interocular portion about as long as lower, subocular part; surface moderately and uniform convex, with a few stiff hairs placed in larger punctures, the hairs longer and the punctures coarser over apical third. Eyes bare. Thorax much longer than high. Humeral margin of pronotum strongly raised into a sharp collar, almost lamellar dorsally, much lower and blunter on the vertical sides to near the fore coxae; humeral angles distinctly projecting, but broadly rounded off, not wing-like. Mesopleuron without even a trace of prepectal suture; mesepisternal suture complete and deep. Propodeum entirely covered with distinct striation, also in the deep and broad median concavity; striae very fine and close over upper third to half, much stronger and sharper over apical remainder and with some finer striae in the broader intervals. Body with a microscopic granular sculpture, not visible with a hand-lens; most of head, mesopleura and metapleura in addition with distinct, but scattered, fine to medium-sized punctures. The pubescence is very short, often somewhat velvety or slightly golden, more rarely silvery.

Male. Apex of abdomen depressed, bluntly rounded off; seventh sternite flattened or slightly concave, without median tubercle, the sides low and not projecting in profile. Eyes more bulging; upper outer orbits seen from above about as long as upper part of eye, but narrower than the eye in profile. Oculo-malar space nearly one-fifth of length of eye. Clypeus irregularly pentagonal, almost flat but not depressed,

nearly as long as wide, contiguous to the eyes for a longer distance (half or more of the length of the oculo-malar space); two apical margins converging to a very broad, bow-like apex; surface covered with dense, short, silvery pubescence, with a few evenly scattered stiff hairs. Antennae moderately slender throughout, very slightly thicker before the middle of the flagellum; all segments normal and (except for the second) longer than wide; third slightly longer than scape; thirteenth about one and one-half times as long as twelfth, nearly straight, scarcely narrowed beyond middle, broadly rounded at tip. Genitalia of the usual type; shaft of penis with a small, short oval, apical spoon; basal lobules broadly triangular and very bluntly rounded off. Remainder as is female.

Length (h. + th. + t.l + 2) of female and worker: 12 to 20 mm. (fore wing, 15 to 26 mm.); of male: 12 to 17 mm.

Distribution. — *P. canadensis* is the most widely distributed American *Polistes,* as it extends from close to the northern boundary of the United Estates to northern Patagonia. Its northern limit runs through northern Arizona, South Dakota, Iowa, Illinois, Indiana and Ohio to Connecticut. The most northern locality known at present is Springfield, South Dakota (in the valley of the Missouri River, close to 43° N.), for the var. *annularis.* In the Antilles it is found only in some of the Lesser Antilles. The species is unknown from the Dominion of Canada, the Rocky Mountains, the Pacific states and Chile.

Color Variation. — In the present paper I recognize by names nineteen color forms. I have attemped to separate these in a key; but it should be realized that some transitional specimens must be placed arbitrarily. On the other hand, I have united under typical *canadensis* specimens which differ markedly in general coloration, from black with a few ferruginous blotches to almost entirely reddish-brown.

Attempts to subdivide this aggregate have not given satisfactory results, owing to the many transitional specimens and the apparent lack of correlation with geographical distribution.

Key to Color Forms of *P. canadensis*

1. Abdomen extensively or mostly yellow, ivory-yellow or orange-yellow; either with several apical fasciae or with some of the tergites mostly yellowish 2

   Abdomen light ferruginous, reddish-brown, mahogany-brown to black, either without yellowish markings or with only the first tergite partly or mostly yellowish 10

2. Head, thorax, abdomen, legs and antennae almost entirely pale yellow, with few ferruginous blotches. Wings pale russet, more yellowish over apical third. (Paraguay) ..... var. *eburneus.*
   Ground color of body more extensively light brownish-red to black... 3

3. Ground color of thorax mostly black or blackish-brown; hind tarsi yellow 4

   Ground color of body light reddish-brown, with many yellow markings, at least on head and abdomen 6

4. Head black, extensively marked with yellow; thorax black, pronotum partly, tegulae and scutellum orange-yellow; abdomen mostly yellow, elsewhere blackish, first and second tergites somewhat reddish at the limits of black and yellow areas. Wings mostly purplish-black, only extreme base and costal areas somewhat russet; veins and stigma black. (Arizona, northern Mexico) ..... var. *navajoe.*

   Abdomen either mostly orange-yellow or ferruginous with yellow markings. Wings ferruginous, very slightly purplish; veins and stigma russet 5

5. Form of Texas and northern Mexico. Head black, extensively marked with orange-yellow; thorax blackish-brown, only narrow margins of pronotum and tegulae orange; abdomen mostly yellow to orange-yellow, elsewhere ferruginous, only base of first tergite black.....
   ..... var. *comanchus.*

   Form of northern Argentina. Head yellow with a few ferruginous blotches; thorax black and ferruginous, with many yellow markings (often two stripes on disk of mesonotum); abdomen ferruginous with very broad apical fasciae, the posterior segments mostly yellow ..... var. *buyssoni.*

6. Forms of Arizona and Mexico 7

Forms of southern Brazil, Uruguay, Paraguay and northern Argentina. 9

7. Head and thorax reddish-brown, with very few or no yellow markings. Wings purplish-black; veins and stigma blackish-brown. (Central Mexico) ..... var. *mexicanus.*

Head extensively yellow; thorax sometimes marked with yellow..... 8

8. From the Grand Canyon of Arizona. Wings uniformly russet; veins and stigma russet. Thorax without yellow markings..... ..... var. *kaibabensis.*

Form of northwestern Mexico. Wings somewhat purplish-black, tinged with russet basally and along costa; veins and stigma russet. Thorax somewhat tinged with yellowish ..... var. *wheeleri.*

9. Thorax almost entirely reddish-brown, with very few yellow markings ..... var. *cavapyta.*

Thorax more or less blackish-brown, with ferruginous blotches and many yellow markings (often 2 stripes on mesonotum)..... ..... var. *buyssoni.*

10. Head extensively yellow or orange-yellow, the occiput and outer orbits mostly of that color 11

Head, including occiput and outer orbits, mostly ferruginous, mahogany-brown or blackish; clypeus sometimes yellow 12

11. Body black, more or less blotched with mahagany-brown to ferruginous. First tergite with a broad apical yellow area. Wings purplish-black, slightly more russet over apical third. (Venezuela)..... ..... var. *anduzei.*

Body chestnut-brown or dark ferruginous. First tergite either without yellow or with only a narrow apical fascia. Wings either uniformly purplish-black or slightly russet apically (British Honduras to Ecuador, the Guianas and Brazil) ..... var. *infuscatus.*

12. Body, including hind tarsi, coal-black, except for the partly ferruginous flagellum. Wings subhyaline, slightly tinged with ferrugnous. (Southern Brazil) ..... var. *satanulus.*

Not entirely coal-black; hind tarsi pale yellow, orange or ferruginous. Wings darker 13

13. Small form of the Lesser Antilles. Body reddish-brown. First tergite with a distinct, narrow, apical yellowish fascia. Wings yellowish-russet ..... var. *cinctus.*

Forms of the American continent, usually larger 14

14. Body black and mahogany-brown. First tergite with a broad apical yellow area. Wings purplish-black, with the apical third slightly more russet. (Venezuela) ..... var. *weberi.*

First tergite either without yellow or with only a narrow apical yellow fascia 15

15. Thorax and abdomen jet-black; head and antennae (except for median black ring of flagellum) bright or dull ferruginous. First tergite without apical fascia. Wings purplish-black throughout. (Central America to Brazil) ..... var. *erythrocephalus.*

Body more uniformly colored; ferruginous head not contrasting with thorax and abdomen 16

16. Body jet-black, scarcely with any ferruginous or yellowish markings. Antennae black, very slightly chestnut-brown at base and tip of flagellum. Mid and hind tarsi dirty-yellow to orange. First tergite without apical fascia. Wings purplish-black throughout. (Brazil, Colombia) ..... var. *satan.*

Body not uniformly jet-black. Flagellum with a median black ring. Wings often not purplish-black throughout 17

17. Wings fairly well divided into purplish-black basal two-thirds and pale russet apical third. First tergite usually without apical fascia. (Panama, Colombia) ..... var. *panamensis.*

Wings either uniformly colored or slightly and gradually more russet towards the tips 18

18. Small form of Uruguay and northern Argentina (fore wing 16 to 18 mm. long). Colored like typical *canadensis,* but wings paler russet throughout ..... var. *ferreri.*

Averaging larger (forewing 17 to 26 mm.) Wings darker, usually brownish or purplish-black 19

19. Form of the eastern United States. Head and thorax dark mahogany-brown, sometimes blotched with black. Abdomen usually black, sometimes with a few mahogany-brown blotches; first tergite always with a distinct apical yellow fascia ..... var. *annularis.*

Form of southern Arizona, Mexico, Central and South America. Body fairly uniformly light brown, ferruginous, dark mahogany-brown, or blackish. Apical fascia of first tergite more or less indicated or wanting ..... typical *canadensis.*

1. **Polistes canadensis**, typical form.

Vespa canadensis Linnaeus, 1758, Syst. Nat., 10th Ed., I, p. 574 ("in America septentrionali").

Vespa lanio Fabricius, 1775, Syst. Entom., p. 365 (no sex; Brazil).

Polistes unicolor Lepeletier, 1836, Hist. Nat. Ins. Hym., I, p. 521 (♀; Cayenne).

I have seen typical *canadensis* from extreme southern Arizona (Nogales; Ruby), Mexico, Guatemala, Republic of Honduras, Colombia, Venezuela, British Guiana, Trinidad, Brazil (as far south as Río Grande do Sul), northern Argentina (Iguazu Falls), Paraguay, Bolivia and Peru.

The name notwithstanding, no wasp agreeing with Linnaeus' description of *canadensis* is now known to occur in Canada or the eastern United States. Linnaeus gave as the collector P. Kalm, who travelled in the northeastern United States, but not in tropical America, so far as known. Possibly Linnaeus made an error and actually received his wasp from Degeer, who a few years later (1773) described this form from Surinanm. In my earlier paper I recognized *lanio* as a distinct color form, but so many variants connect it with typical *canadensis*, even in same locality, that I am unable to segregate them. I have seen Fabricius' type of *lanio* at the British Museum (J. Bequaert, 1928, Bull. Brooklyn Ent. Soc., XXIII, p. 57).

Original Description of *V. canadensis:* "V. thorace squamis duabus, abdominis ferruginei segmento primo obconico".

Original Description of *V. lanio:* "V. fusca, capite ferrugineo, antennis medio nigris. - Statura praecedentis [*carnifex*]. Antennae ferruginae, ante apicem nigrae. Thorax fuscus, lobo antico subferrugineo. Abdomen fuscum. Alae nigricantes. Pedes ferruginei, femoribus fuscis".

Original Description of *P. unicolor:* "Entièrement d'un brun ferrugineux et partout d'une teinte uniforme. Corselet sans ponctuation distincte; métathorax à stries transversales fines. Ailes d'un brun ferrugineux, plus foncé vers la base. Milieu des antennes noir. Long 12 à 13 lig. [= 27 to 29 mm.]". This a literal translation of the Latin diagnosis, not copied here.

2. **P. canadensis** var. **infuscatus** Lepeletier.

Polistes infuscata Lepeletier, 1836, Hist. Nat. Ins. Hymn., I, p. 520 (♂ ; Cayenne).

Polistes canadensis amazonicus W. A. Schultz, 1905, Hymenopteren-Studein, p. 113 (♀ ; Belem do Pará, Brazil).

Lepeletier's account fits well specimens agreeing with Schulz's first description of his *amazonicus*, based on two females from Belem do Pará. Such specimens are common in the forests of British Guiana, Dutch Guiana and French Guiana (Cayenne), as well as of the Lower Amazon. In the Upper

Amazon, Colombia, Panama, Peru and Ecuador specimens with yellow occiput and upper outer orbits often have the wings markedly russet over the apical third, being transitional to var. *panamensis,* while others are only slightly yellowish over the back of the head. Schulz's specimens from Palmar, Ecuador and Popayan, Colombia, were evidently such intergrades.

Original Description of *P. infuscata*: "D'un brun ferrugineux; antennes de cette même couleur; leurs premier, second et troisième articles de la base, et le bout, plus clairs, d'un jaune testacé. Derrière de la tête d'un jaune testacé, ainsi que la partie du vertex sur les côtés des ocelles. Corselet opaque; métathorax strié transversalement. Abdomen lisse, assez luisant, avec un léger reflet glauque, d'un ferrugineux moins brun que le corselet. Pattes de la couleur de l'abdomen. Ailes d'un roux noirâtre; les antérieures plus foncées à partir de la base jusque passé le milieu, ayant un faible reflet voilet. Long. 14 lig. [= 31.5 mm.]". This is a literal translation of the Latin diagnosis, not copied here.

Original Description of *P. c. amazonicus:* "Allgemeine Körperfarbung dunkelrotbraun, Mitte der Fühlergeissel, Brustseiten, Mittelsegment, Hüften, Schenkelringe, Schenkel und Schienenspitze schwarz; Scheitel beiderseits bis zum mittleren Wangenteile herab hellgelb; Flügel pechschwarz, mit matten, violetten Glanze, Kosta und Stigma rostrot. Körperlänge 21-22 mm.".

3. **P. canadensis** var. (or subsp.) **anduzei**, new.

There is a remote possibility that the form here described as new is *Polistes urceolata* "Klug" Erichson (1848, in Schomburgk, Reisen in Britisch Guiana, III, p. 590; no sex; British Guiana), briefly described as follows: "Der vorigen [= *infuscata* Lepeletier] sehr ähnlich, aber dunkler gefärbt, der erste Hinterleibsring hinten gelb, die Schenkel schwarz. Ist auch der *P. annularis* nahe verwandt". The description also fits *P. c.* var *weberi.* The types, at the Berlin Museum, should decide the matter.

Female and Worker. — Body mostly black, with a faint brownish tinge over the abdomen; second tergite more ferruginous; most of head, dorsal aspect of pronotum, antennae (except for black ring of flagellum), and occasionally two blotches on mesonotum, mahogany-brown to ferruginous. Yellow markings as follows: occipital area of head; outer orbits (more or less orange); broad apical area of first tergite (more sulphur-yellow), notched medially and reddish-brown at the border of the black base; knees; basal half or more of all tibiae (somewhat rufous); and all tarsi. Wings strongly infuscate, purplish-black over basal two-thirds, gradually fading to the more russet apical third.

Male unknown.

Holotype: Tabay, State of Merida, 1760 m. altitude, **Venezuela**, female (Pablo Anduze). *Paratypes:* ten females taken with holotype. All at Museum of Commparative Zoölogy, Cambridge, Mass.

Agreeing in most characters with var, *weberi*, but with the occiput and outer orbits yellow as in var. *infuscatus*; the latter has only a very narrow or no apical yellow fascia on the first tergite.

4. **P. canadensis** var. **annularis** (Linnaeus).

Vespa annularis Linnaeus, 1763, Centuria Ins. Rar., p. 30 (no sex; Pennsylvania). Degeer, 1773, Mém. pour Servir à l'Hist. des Ins., III, p. 583, Pl. XXIX, fig. 11.

Vespa cincta Drury, 1773, Illustr. Nat. Hist., Index to Pt. I published with Pt. II); description without name in 1770, *Op. cit.*, I, p. 98, Pl. XLIII, fig. 6 (no sex; Virginia). Not of Degeer, 1773; nor of Fabricius, 1775.

Vespa virginiensis "Drury" Dalla Torre, 1894, Cat. Hym., IX, p. 122 (as a synonym of *Polistes annularis;* with reference to Drury's Pl. XLIII, fig. 6). Drury never used the specific name *virginiensis* for a *Vespa* and he called his Pl. XLIII, fig. 6, *V. cincta.*

Polistes annulata "Moebius" Dalla Torre, 1894, Cat. Hym., IX, p. 123 (as a synonym of *P. annularis*). In the paper cited by Dalla Torre, Moebius uses only the specific name *annularis* on pp. 322, 329 (not 330) and 332.

The var. *annularis* is a common wasp in the southeastern United States, reaching north to Connecticut and southern Iowa, west to South Dakota, Oklahoma, eastern Kansas and eastern Texas. The distribution is detailed in my earlier paper. I have since seen specimens from Arkansas and South Dakota (Springfield). All published records from outside the United States were based on misidentifications. Kriechbaumer's specimen from Caracas (1900, Berlin Ent. Zeitschr., XLV, p 98; repeated in 1904 by W. A. Schulz), was probably var. *weberi*; while that from Martinique was var. *cinctus.* Similar erroneous records were published by Stoner (from Barbados), Cheesman (from Panama), Schrottky (from Argentina), Brèthes (from Brazil), and others.

There is no difficulty about recognizing Linnaeus' *V. annularis* and Drury's *V. cincta* as the present wasp.

Original Description of *V. annularis:* "Fusca, genubus antennarum apicibus margineque primi segmenti abdominis flavis. - Media, Alae planae. Thorax maculatus, ante alas magis ferrugineus. Tibiarum bases flavescentes".

Original Description (1770) of *V. cincta:* "A full inch in length. The head, is of a dark brown colour, like the rust of iron. The eyes, are large, oblong, and of the colour of horn. Between them, on the top of the head, are the three little eyes, as mentioned in some of the preceding species. The antennae, are shorter than the thorax, and dark brown, but yellow at their extremities; having a principal joint very near the head. The thorax, is dark brown, also with a black stripe on each side. The four wings, extending beyond the abdomen, are thin, membranaceous, and dark brown, not perfectly transparent, and doubled or folded lengthways together. The abdomen, is black, except the first ring next the thorax, which is dark orange, verged with yellow. The fore thighs [femora], are dark brown; the other parts of those legs, yellow. The other legs are dark brown; the shin [tibia] joints and bearers [tarsi], being yellow. The latter are composed of four articulations, besides the claws".

5. P. canadensis var. buyssoni Brèthes.

Polistes cavapyta var. *thoracica* R. du Buysson, 1906, Ent. Medd., Copenhagen, III, p. 19 (♀ ☿ ♂; Santa Rosa; Uspallata; Chacras de Coria; all in Mendoza Province, Argentina). Not *Polistes thoracicus* Fox, 1898.

Polistes cavapyta var. *buyssoni* Brèthes, 1909, An. Mus. Nac. Buenos Aires (3), X, p. 456 (new name for var. *thoracica* R. du Buysson).

The var. *buyssoni* is common in various localities or northern Argentina and the adjoining areas of Bolivia. It extends into northern Patagonia. It intergrades with var. *cavapyta,* which often occurs with it in the same locality.

Original Description of *P. c.* var. *thoracica:* "Semblable au type [= var. *cavapyta*] dont il se distingue par son corps plus petit, par una tache noire sur le vertex; par le thorax noir profond, avec le bord antérieur et le bord postérieur du pronotum, la marge antérieure de l'écusson, jaune clair et une tache rousse sur chaque côté du pronotum. Les hanches, les trochanters et la plus grande partie des cuisses sont noirs, ainsi que la base du 1er. et du 2e. tergite de l'abdomen. Les bordures apicales des segments abdominaux sont jaune-clair. Long 13-18 mill."

6. P. canadensis var. cavapyta H. de Saussure.

Polistes cavapyta H. de Saussure, 1853, Et. Fam. Vesp., III, p. 87. Pl. XI, fig. 8 (♀ ♂; Corrientes, Argentina).

?Polistes opalinus H. de Saussure, 1853, Et. Fam. Vesp., III, p. 89, Pl. XII, fig. 6 (♀; Brazil).

The var. *cavapyta* is the common form of the species in northern Argentina, Uruguay, southern Brazil and Paraguay.

R. du Buysson (1910, Zool. Jahrb., Abt. Syst., XXIX, p. 234) stated that the types of *P. opalinus* at the Paris Museum are two females of *cavapyta*; but de Saussure's figure does not agree with any *cavapyta* I have seen. I suspect that du

Buysson confused several forms or species of *Polistes* under *cavapyta*, as he says that it extends from Mexico and the Guianas to Buenos Aires. True *cavapyta*, as here understood, is not found north of Paraguay and southern Brazil.

Original Description of *P. cavapyta:* "Ferrugineus; capite flavo, antennis medio nigris; abdominis segmentis 2-6 margine pallida; alis obscuris. Variat corpore fusco, lateribus nigris. Long. 20 mill.; env. 44 mill. *Fem.* Assez grand. Métathorax finement strié. Insecte un peu voluté, ferrugineux. Tête jaune clair; vertex et antennes ferrugineux; ces dernières noires au milieu. Les deux bords du prothorax souvent liserés de jaune clair; flancs un peu variés de noir; écaille jaunâtre. Abdomen soyeux, son premier segment entièrement ferrugineux, les autres assez irrégulièrement bordés de jaune clair, la première bordure la plus étroite; anus jaune clair; les bordures presque interrompues au milieu par un trait brun. Pattes ferrugineuses, genoux et tarses jaunes. Ailes brunes, à peu près de la couleur du corps, sans reflet violet distinct. *Var. A.* Ecusson et le premier segment de l'abdomen bordés de jaune pâle. *Var. B.* Abdomen ferrugineux. *Var. C.* Métathorax brun. *Var. D.* Entièrement ferrugineux, ou brunâtre; taille assez variable. *Mâle.* Devant de la tête argenté. *Rapp. et diff.* Cette espèce est très difficile à différencier par une description, mais elle est bien distincte. On la reconnanaît parfois au premier segment de l'abdomen, qui est sans bordure jaune, et à sa tête jaune; mais ses couleurs, si peu constantes, peuvent induire en erreur; elle est fréquemment entièrement ferrugineuse, alors il sera impossible d'arriver avec certitude à sa détermination. Cette espèce a l'abdomen conique, fusiforme, comprimé, sortout au bout, et se distingue par là de certaines variétés du *P. pallipes*, qui l'a au contraire déprimé; il est de l'Amérique du Sud, de l'Uruguay et du Brésil; le *pallipes* est, au contraire, de l'Amérique du Nord. Il a de plus les ailes d'un roux, sensiblement moins foncées que celles du *P. canadensis*, presque sans reflet et de plus foncées à la base qu'au bout; le *pallipes* a des ailes enfumées de gris et moins colorées que dans le *cavapyta*, mais d'une teinte plus obscure, quoique moins intense, c'est-à-dire moins rosse. Les ailes du *P. ferreri* ont exactement la même couleur que celle du *P. cavapyta*. Quoique d'une couleur différente, ce dernier en est peut-être une variété??"

Original Description of *P. opalinus:* "Capite et thorace rufis; metathorace antennisque medio nigris; abdomine nigro, opalino nitente, segmentis margine flavescente, secundo punctis duobus rufis submarginalibus, ultimis margine piceo; pedibus nigris, genubus tarsisque flavis; alis obscure brunneis. ♀, Long. 18 mill. env. 44 mill. *Fem.* Chaperon portant quelques petites ponctuations distinctes. Prothorax rebordé; métathorax finement strié. Abdomen lisse, en fuseau régulier, presque en losange allongé, comprimé au bout. Tête d'un roux ferrugineux; antennes noires en dessus et en dessous, depuis le troisième jusqu'au bout du huitième article. Corselet roux; flancs et métathorax noirs; bord postérieur du prothorax, écaille et bord antérieur de l'écusson, très indistinctement jaunâtres; ces teintes souvent nulles, souvent plus distinctes. Abdomen lisse, luisant, d'un noir bleuâtre, avec un reflet glauque, bleuâtre, une teinte lactée. Bord du premier segment liseré de jaunâtre; celui du deuxième orné d'une bordure jaune-pâle, fondue avec la couleur foncière, bi-échancrée sur les côtés, et offrant de chaque côté, en avant des échancrures, un point rouge ou jaune. Les autres segments bordés de brun. Pattes noires, genoux et tarses jaunes. Ailes d'un brun ferrugineux très intense, avec un faible reflet violet. *Var. probable.* Les points du deuxième segment fondus avec la bordure. *Rapp. et diff.* Très distinct par la couleur de son abdomen et par ses reflets opalins. Le corselet et les ailes sont exactement comme dans le *P. ferreri*".

7. **P. canadensis** var. **cinctus** Lepeletier.

Polistes cincta Lepeletier, 1836, Hist. Nat. Ins. Hym., I, p. 522 (♀; Martinique).

The var. *cincta* is peculiar to the Lesser Antilles: Martinique, St. Vincent, St. Kitts, the Grenadines, Barbadoes; also recently introduced into Monserrat and St. Lucia.

In my earlier paper I suggested that *Vespa (Polistes) dominica* Vallot (1802, Concordance Systématique, of Réamur's "Memoires") might have been var. *cinctus*. I have not yet seen Vallot's work; but, according to de Saussure, the name was proposed for the wasp figured by Réaumur, 1742, Mém. Hist. Ins., VI, Pl. XIV, figs. 9-10, from Santo Domingo (see p. 207). This appears to represent *Polistes major* Palisot de Beauvois. No form of *P. canadensis* is known to occur in Santo Domingo.

Original Description of *P. cincta:* "Ferrugineuse: métathorax légèrement strié transversalement: milieu des antennes noir. Partie postérieure du premier segment de l'abdomen et tarses jaunes. Long. 12 lig. [= 27 mm.]". This is a literal translation of the Latin diagnosis, not copied here.

8. **P. canadensis** var. **comanchus** H. de Saussure.

Polistes comanchus H. de Saussure, 1857, Ann. Soc. Ent. France, (3) V, p. 314 (no sex; New Mexico).

The var. *comanchus* is a typical wasp of the Upper Sonoran life zone in southwestern Texas, New Mexico and the State of Coahuilla, Mexico.

Original Description of *P. comanchus:* "Sat validus. Clypei margo rotundata, haud acute dentata. Abdomen aurantiacum; ejus segmentis flavo marginatis; primo basi nigro. Thorax ater, antice ferrugineo limbatus. Caput ferrugineum, vertice et antennarum medio atris. Alae ferrugineae".

9. **P. canadensis** var. (or subsp.) **eburneus**, new.

Male. — Entirely pale sulphur-yellow without any black markings. Blotches on upper side of antennal segments 3 (at tip), 4, 5, and 6, on lower part of mesopleura and metapleura, on sides of propodeum (close to spiracles), near base and sides of tergites 1 and 2, and on upper part of coxae and femora, light russet; tibial spurs yellow. Teeth of mandibles blackish-brown. Wings yellowish-russet with purplish sheen, paler over apical third; veins and stigma light russet. Short pubescence silvery-white, frosty. Fore wing 16 mm. long.

Female and *Worker* unknown.
Holotype: Villarica, **Paraguay**, male (F. Schade).

This is the most xanthic American *Polistes* seen thus far. It would be of interest to know the ecological conditions under which it lives, as the color is that usually found in wasps of an extremely dry or desertic environment. Structurally the holotype agrees with other males of *P. canadensis,* and, although the specific characters of *Polistes* are best defined in this sex, I am unable to separate it as a species.

10. **P. canadensis** var. **erythrocephalus** Latreille.

Polistes erythrocephala Latreille, 1813, in Humboldt and Bonpland, Recueil d'Observations de Zool. Anat. Comp., II, p. 96, Pl. XXXVIII, fig. 3 (♀; South America).

I have seen var. *erythrocephalus* from Nicaragua, Costa Rica, Panama, Colombia and southern Brazil. It is sometimes found in collections under the incorrect name *P. rufidens.*

In my earlier paper I gave the date of publication of *P. erythrocephala* as 1817, on the authority of D. MacGillavry (1931, Ent. Ber. Nederl. Ent. Ver., VIII, Nº 177, p. 179). I am now adopting the date given by C. D. Sherborn (1899, Ann. Mag. Nat. Hist., (7) III, p. 428), who says that the part of Humboldt and Bonpland's work containing p. 96, appeared in 1813.

Original Description of *P. erythrocephala:* "Noire, avec la tête ferrugineuse et les ailes bleues; sommet des antennes, genoux et tarses d'un roussâtre jaunâtre; anus brun. Nigra, capite ferrugineo, alis cyaneis; antennarum apacibus, genubus tarsisque flavido-rufescentibus; ano brunneo. Longueur du corps, 0m.021. On doit placer cette espèce près de celles que Fabricius nomme *lanio, annularis,* etc.; sont corps est proportionnellement plus étroit que celui de la plupart de ses congénères, d'un noir peu luisant, avec la tête d'un rougeâtre obscur, les yeux cendrés, et les ailes d'un bleu foncé et luisant. Les antennes sont roussâtres, plus pâles à leur extrémité, avec le dessus des articles de leur milieu noir. Le corcelet est noir et sans taches. L'abdomen est en forme de fuseau alongé, pédiculé, plus luisant que les autres parties, d'un brun roussâtre, et pointu à son extrémité. Les pattes sont noires, avec les genoux et les tarses d'un roussâtre tirant sur le jaune".

11. **P. canadensis** var. **ferreri** H. de Saussure.

Polistes ferreri H. de Saussure, 1853, Et. Fam. Vesp., II, p. 77 (♀; from Uruguay to Misiones, Argentina).

The var. *ferreri* is restricted to Uruguay and northern Argentina. It is really no more than a dwarfed form of typical *P. canadensis,* with which it seems to intergrade in Paraguay.

Original Description of *P. ferreri:* "Capite thoraceque rufis, metathorace abdomineque nigris, alis ferrugineo-fuscis. ♀. Long. 17 mill.; env. 40 mill. *Ouvr.* Chaperon terminé en angle obtus. Métathorax strié en travers. Abdomen comprimé au bout. Tête d'un roux ferrugneiux; antennes noires au milieu en dessus et en dessous. Corselet noir: prothorax, écaille, mésothorax en dessus et écussons, de la couleur de la tête. Abdomen noirâtre, petit bord des segments brunâtre, se fondant avec le noirâtre. Pattes d'un brun noirâtre, tarses, articultions et tibias antérieurs, jaunâtres; crochets des tarses noirs. Ailes d'un brun foncé, plus claires vers le bout. *Var. A.* Abdomen noir; prothorax indistinctement liseré de jaunâtre le long de ses deux bords. *Var. B.* Abdomen brun, passant au ferrugineux. *Rapp et diff.* Il ressemble assez au *P. canadensis,* mais il s'en distingue par les couleurs parfaitement tranchées du corselet, et par ses ailes bien moins brunes. Il a les ailes colorées comme dans les *P. cavapyta,* et voisins. Il faut pour le distinguer, surtout lorsque ses couleurs ne sont pas parfaitemente nettes, un œil exercé".

12. P. canadensis var. kaibabensis Hayward.

Polistes canadensis var. *kaibabensis* Hayward, 1932, Proc. Utah Ac. Sci., IX, p. 89, Pl. IX, figs. 4, 12, 13 and 16 (♀ ♂ ; northern and southern Rims of the Grand Canyon of the Colorado River, Arizona).

The var. *kaibabensis* is known only from the type locality, where it is common.

Original Description of var. *kaibabensis: "Female*: Total length 24 mm.; length of thorax, 8 mm.; length of abdomen, 13 mm.; length of fore wing, 20 mm. Head light ferruginous with the genae behind the compound eyes, the clypeus except in the center, the lower part of the frons, and the mandibles yellow, tinged with ferruginous. Small areas of black occur on the head as follows: teeth, condyle, and cephalic edges of the mandibles; a narrow strip along the epistomal suture beneath each compound eye; small area about the ocelli; and occiput. Antennae light ferruginous at base and tip, black in middle. Frontal furrow lacking. Thorax with rather large, broadly separated punctations on the mesopleurites. Propodeum with rather coarse, transverse striations. Color of thorax almost entirely light ferruginous except for dark pigmentation along the sutures. Wings ferruginous, about the color of the thorax. Legs ferruginous, becoming lighter at the apex of the femur. Abdomen slender and elongate with the first three segments mostly ferruginous but with yellowish apexes. Segments four, five, and six light yellow tinged with ferruginous. *Male*: Size and general coloration similar to female except that there are indistinct yellowish markings on the venter of the thorax and the entire face is yellowish. Genitalia slender; aedeagus slender and without conspicuous teeth".

13. P. canadensis var. mexicanus J. Bequaert.

Polistes canadensis var. *mexicanus* J. Bequaerrt, 1940, Jl. New York Ent. Soc., XLVIII, p. 10 (♀ ♂ ; Cuernavaca, Morelos, Mexico).

The var. *mexicanus* is known from Central and Southern Mexico (States of Morelos, Mexico and Oaxaca).

Original Description of var. *mexicanus:* "Female and Worker. Body and legs bright reddish-brown, only the sutures of the thorax, a median line over anterior half of mesonotum and a narrow stripe in concavity of pro-

podeum (widened below), black; middle of flagellum infuscated; the following markings are yellow: apical fasciae on all tergites and second to last sternites (reduced on first and second, very extensive on the others and more or less divided on each side by a wavy reddish line or sometimes emarginate) and the knees and hind tarsi more or less. Wings very strongly infuscate, purplish-black. *Male.* Colored exactly like the female".

14. P. canadensis var. navajoe Cresson.

Polistes navajoe Cresson, 1868, Trans. Amer. Ent. Soc., I, p. 383 (♀ ; from Fort Wallace, Colorado, to Fort Craig, New Mexico; also in Arizona).

The var. *navajoe* is a characteristic wasp of the Upper Sonoran life zone of Arizona and the adjoining parts of New Mexico (Silver City, etc.) It is also found in Northern Mexico (States of Sonora and Sinaloa).

Original Description of *P. navajoe: "Female.* Head pale yellow, the venter, occiput and tips of mandibles, black; a yellow spot, confluent with the orbits, on each side behind the ocelli; clypeus rounded and ciliated anteriorly, sparsely punctured and pubescent; cheeks tinged with fulvous; antennae fulvo-ferruginous, the middle of flagellum black; thorax velvety-black; posterior margin of the prothorax, broader in front, tegulae and scutellum ferruginous; the mesothorax has sometimes a faint reddish stain on each side; metathorax pubescent, obliquely striated, with a deep central, longitudinal channel; wings fuscous, ferruginous along the costa and at base, subviolaceus, nervures and stigma ferruginous; legs black, tips of all the femora, the four anterior tibiae, basal half of the posterior pair, and all the tarsi, tinged with fulvous; abdomen longer than the head and thorax, sericeous, the first and second segments above and beneath, except apical margins, broader on the second segment, and the basal margin of the third segment above and beneath, black; the remainder lemon-yellow; the anterior half of the apical margin of the second segment above is fulvous, shading gradually into the yellow, sometimes this margin is entirely fulvous; the third and remaining segments have a faint, central, longitudinal, fulvous streak and a lateral spot of the same color, that on the third segment sometimes very distncit. Length 9-10 lines [= 20 - 22 mm.]".

The holotype selected by E. T. Cresson (1916, Mem. Amer. Ent. Soc., I, p. 106), now at the Academy of Natural Sciences in Philadelphia, is from New Mexico.

15. P. canadensis var. panamensis Holmgren.

Polistes panamensis Holmgren, 1868, Kongl. Svenska Freg. Eugenies Resa, Vetensk. latagg., II, Zool., pt. 1, Ins., Hymen, p. 439 (no sex; Panama),

The var. *panamensis* is a common wasp in Panama and parts of northern Colombia. Farther south it intergrades with var. *infuscatus.*

The types at the Stockholm Museum, where I saw them in 1913, are four females; one was selected as the holotype.

Original Description of *P. panamensis:* "Fusco-castaneus, incisuris thoracis ventreque ex parte nigricantibus; antennis rufis, flagello medio nigro, apice fulvo; ano ferrugineo; alis flavescenti ferrugineis basin versus saturatius fuscis; pedibus nigris, femoribus apice, tarsis tibiisque fulvescentibus, his posterioribus apice nigris. Long. 20 - 22 mm. Caput pone oculos vix angustatum, a fronte visum subquadrangulare, alutaceum, parce punctulatum. Clypeus majusculus, perparum convexus, margine apicali hirto. Genae infra oculos late descendentes. Mandibulae subaequilatae, denticulis tribus apice instructae. Oculi oblongi, paullo supra basin antennarum profunde incisi, nudi. Ocelli 3, triagulum formantes. Antennae validiusculae fractae; scapo elongato, paullulum curvato; articulo accessorio minuto; primo flagelli longiusculo, cylindrico, secundo latitudine perparum longiore, 3-5 subquadratis, ultimo subconico, apice obtuso. Thorax capite angustior, alutaceus, opacus; prothorace ante marginem anticum linea vel carina sat elevata instructo; pleuris linea impressa, furcata infra alas notatis; scutello transverso; metathorace apicem versus sensim declive, in medio longitudinaliter canaliculato, apice laminato, foveolato, lateribus transversim striatis, spiraculis prope basin sitis, elongatis. Abdomen fusiforme; segmento primo conico; secundo majusculo; sequentibus apicem versus magnitudine sensim decrescentibus; ventre convexo. Alae modice latae, convolutae; cellula radiali lanceolata, ab apice alae remota; cubitali secunda quinqueangulari nervos duos recipiente; tertia oblique quadrangulari. Pedes mediocres; tibiis anticis uni posterioribus bicalcaratis; unguiculis tarsorum simplicibus. Haec species *Pol. canadensi* primo intuitu sat similis, colore tamen totius corporis dilutiore et pictura alarum ab hoc diversa videtur".

16. P. canadensis var. satan J. Bequaert.

Polistes canadensis var. *satan* J. Bequaert, 1940, Jl. New York Ent. Soc., XLVIII, p. 11 (♀ ♂; Lassance, Minas Geraes, Brazil).

The var. *satan* is known from Colombia (Dept. Cundinamarca) and Brazil (State of Minas Geraes).

Original Description of var. *satan: "Female and Worker.* Head, thorax and abdomen jet-black, scarcely with any ferruginous or yellowish markings; a very narrow inner border of the eyes, outer orbits, lower portion of clypeus, mandibles, hind margin of pronotum and a blotch on tegulae, very slightly suffused with reddish-brown. Antennae black, base and apex more or less tinged with chestnut-brown. Legs black; base of tibiae, outer side of fore tibiae, and fore tarsi more or less ferruginous; mid and hind tarsi dirty yellow to orange. Wings uniformly bluish-black, with black veins and costa; stigma dark brown. *Male.* Almost exactly like the female; very narrow inner orbits dirty yellow".

17. P. canadensis var. satanulus J. Bequaert.

Polistes canadensis var. *satanulus* J. Bequaert, 1940, Ent. News, LI, p. 82 (♀; Joinville, Santa Catharina, Brazil).

The var. *satanulus* is known only from the type locality.

Original Description of var. *satanulus: "Female.* Entirely shiny coal-black, except for the flagellum which is mosttly ferruginous, darker above. Wings subhyaline, slightly suffused with ferruginous, somewhat darker anteriorly; veins of basal two-thirds and stigma brownish-black, those of apical third pale ferruginous".

18. **P. canadensis** var. **weberi** J. Bequaert.

Polistes canadensis var. *weberi* J. Bequaert, 1940, Jl. New York Ent. Soc., XLVIII, p. 12 (♀ ; Macuto near La Guaira, Venezuela).

The var. *weberi* is known only from northern Venezuela.

Original Description of var. *weberi: "Female and Worker.* Mostly black, with brownish tinges over some of the abdominal segments; most of head, most of pronotum, tegulae, a small spot in upper corner of mesopleura, and antennae (except for median black area of flagellum), mahogany-brown. Pale sulphur-yellow markings restricted to the large apical margin of first tergite (emarginate in the middle and separated from the black base by a reddish-brown area), the knees, the basal half or more of all tibiae, and all tarsi. Wings strongly infuscated, purplish-black in basal two-thirds, more russet in apical third. *Male* unknown".

19. **P. canadensis** var. **wheeleri** J. Bequaert.

Polistes canadensis var. *wheeleri* J. Bequaert, 1940, J. New York Ent. Soc., XLVIII, p. 12 (♀ ; Bochibampa Bay, Guayamas, Sonora, Mexico).

The var. *wheeleri* is known only from northwestern Mexico (State of Sonora).

Original Description of var. *wheeleri*: "Female. Body and legs bright reddish-brown; only the ocellar area, sutures of the thorax, a median line over anterior half of mesonotum and a narorw stripe in concavity of propodeum (widened below), black; middle of flagellum infuscated. The following markings are yellow: clypeus, lower half of face, most of outer orbits and mandibles, under side of scape, apical fasciae on all tergites and on second to last sternites (reduced on first and second, very extensive on the others and more or less divided on each side by a wavy redidsh line), the knees, the basal third of all tibiae, and most of all tarsi. Wings moderately infuscated, somewhat purplish-black and tinged with russet basally and along anterior margin. *Male* unknown".

RESUMEN

Polistes canadensis es la especie de *Polistes* del continente americano que tiene mayor distribución, pues extiende su radio desde cerca de la frontera Norte de Estados Unidos de América hasta el Norte de Patagonia. La variedad *annularis* se conoce en Dakota del Sur cerca de Lat. 43° N. En las Antillas, se ha encontrado solamente en las Antillas Menores. El autor reconoce 19 variedades que ha tratado de colocar

en clave pero reconoce que algunos ejemplares que son formas de transición han de colocarse en forma arbitraria. Por otra parte ha colocado bajo *canadensis* típica, ejemplares que difieren en coloración general, desde negro con algunas mancha ferruginosas hasta el rojo castaño. Los ensayos que se han hecho para separar ese grupo no han dado resultados satisfactorios debido a las muchas formas de transición y la aparente falta de correlación con su distribución geográfica. Además describe la subespecie nueva *P. canadensis anduzei*, procedente de Tabay, Estado Mérida a los 1.760 mtts. de altitud. Se parece a la variedad *weberi*, pero con el occipucio y órbitas exteriores amarillo como en la variedad *infuscatus*; esta última no tiene fascia amarilla apical en la primera tergita y si la tiene es muy delgada. También se describe la variedad nueva *P. canadensis eburneus* procedente de Villarica, Paraguay. Esta es la más amarilla de cuantas Polistes se han visto. Sería interesante conocer bajo qué condiciones ecológicas vive, pues el color es el que corrientemente se encuentra en avispas que viven en lugares extremadamente secos o en zonas desérticas. Estructuralmente el holotipo se parece a los otros machos de *P. canadensis* y aunque las características específicas de los *Polistes* se reconocen mejor en este sexo, no se la puede separar como especie.